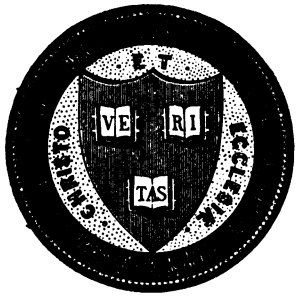

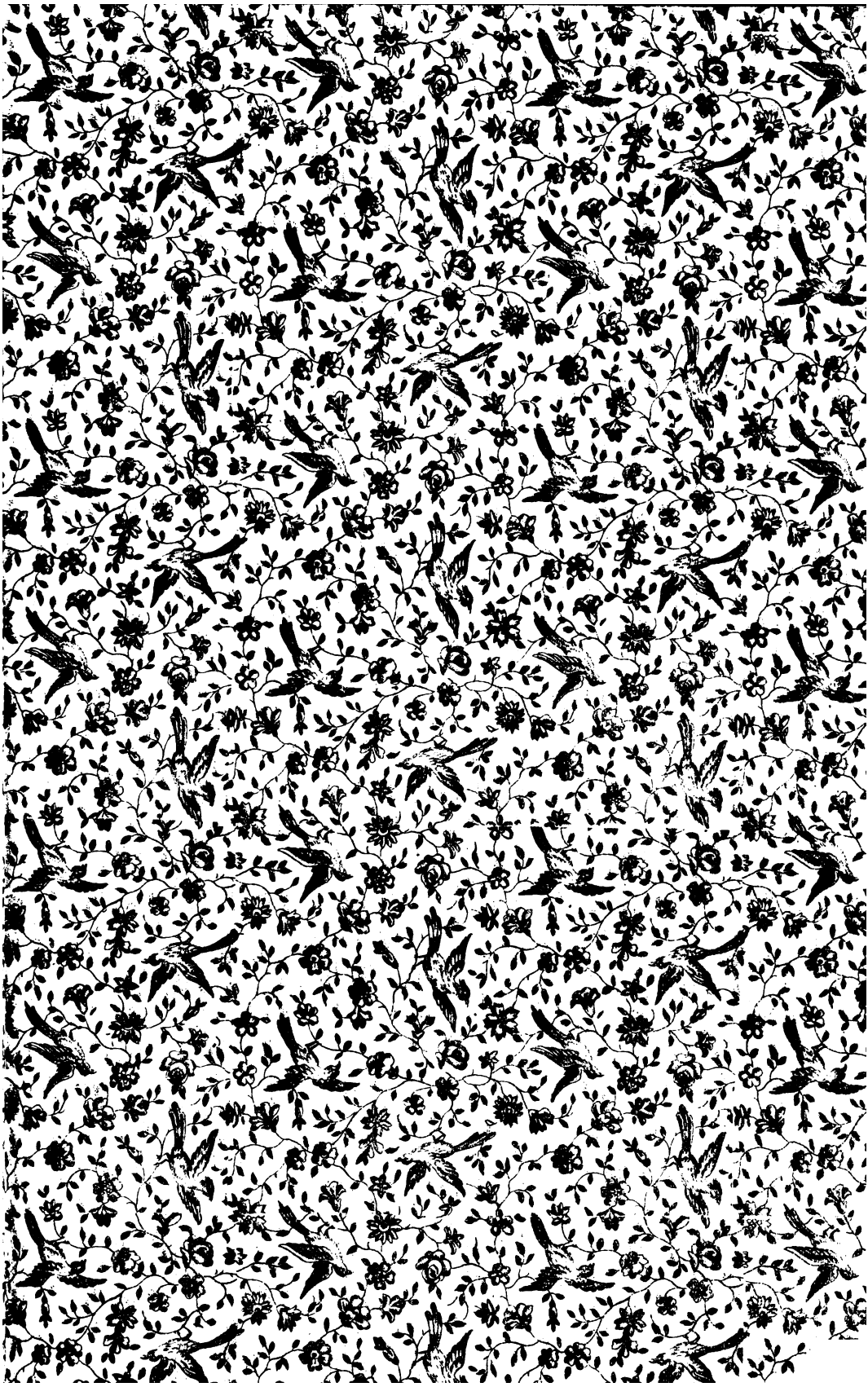

THIRD ANNUAL REPORT

OF THE

Ohio State Forestry Bureau,

TO THE

GOVERNOR OF THE STATE OF OHIO.

FOR THE YEAR 1887.

Edited by Adolph Leue', Secretary,

COLUMBUS:
THE WESTBOTE CO., STATE PRINTERS.
1888.

COLUMBUS, O., *June*, 1888.

To His Excellency, J. B. FORAKER, *Governor of Ohio*—

SIR: In accordance with section 8 of an act to establish a State Forestry Bureau, which is as follows: "This Bureau shall annually make a report to the Governor, which shall contain the results of the investigation, together with such other information as the Board may deem necessary for the promotion of forestry in this State," etc., we present for your favorable consideration a memorandum of our contemplated work necessary to be done, with the assistance of your Excellency, in calling the attention of the Legislature to such thoughts and work as will eventually show the work done under the most trying circumstances.

As you well know that the retaining, preserving, and cultivation of forests is yet in their infancy, and looked upon as an unnecessary undertaking, we would call your attention—

First: To the forest of woods adjacent to the sources of streams such as the Muskingum, Licking, Miami, Scioto and others, where the supply of water for the canals is obtained.

Second: By an injudicious management forests are disappearing rapidly, to the great injury of our agricultural and industrial interests, as has been shown in our two volumes of previous years.

The intelligent farmer and landowners are beginning to take an interest, and are seeking knowledge in matters pertaining to forestry, and the Legislature has wisely suggested that a part of the Ohio State University grounds, with the consent of the Trustees, may be used as a part of an experimental station to the benefit of the students and others interested in forestry. But unfortunately the whole grounds were turned over to the regents for other purposes; therefore, we are compelled to seek other places for an experimental station, and would suggest that the Legislature may turn over to this Bureau some of the Virginia Military lands which are not yet sold.

We also submit to you our Secretary's and other report.

Respectfully submitted.

LEO WELTZ,
President Ohio State Forestry Bureau.

PREFACE.

In presenting this third annual report upon Forestry in Ohio, a few general remarks regarding the labors of the Bureau and its encouragement will not be out of place.

That this volume bears but little evidence of research by the Bureau direct is no evidence that the investigations into the forestal affairs of Ohio have been discontinued, but merely indicates that the labors in this direction are not complete. This is chiefly due to two causes:

First—To the interruption caused by frequent demands from farmers and others interested in forest-tree culture for information on various forestal topics, and by sending out the reports of the Bureau. Frequently these inquiries were of a nature that an intelligent answer involved considerable study. Inconvenient as the attention to this special labor was, it has always been our aim to faithfully reply to all such questions.

Second—The want of sufficient means. Much of the clerical work, such as mailing of reports, sending out of circulars, etc., might have been performed by an assistant, which would have considerably lessened the interruption of the investigation, but the meager appropriation of five hundred dollars for the maintainance of the Bureau made such assistance impossible.

A striking contrast to these impediments are the friendly encouragements from friends of forestry at home and abroad.

Great credit is due to the press in various parts of the country for the assistance rendered to the Bureau in promulgating the results of the labor of former years. In addition to this, some editors and publishers have further aided me in my labor by favoring me with their publications. The following journals are received regularly and kept on file:

The Ohio Farmer, Cleveland, O.
The Country Gentleman, Albany, N. Y.
The Prairie Farmer, Chicago, Ill.
The Kansas Farmer, Topeka, Kas.
Farm and Home, Springfield, Mass.
Northwestern Farmer and Breeder, Fargo, Dak.

Lumber Trade Journal, Chicago, Ill.
The Timberman, Chicago, Ill.
The Woodworker, Indianapolis, Ind.
Manufacturer and Builder, New York, N. Y.
Forest Leaves (Pennsylvania Forestry Associat'n), Philadelphia, Pa.

Several contributions solicited and intended for this volume have been laid over for publication in the next, either to be supplemented by another article, or to supplement an article now under preparation.

ADOLPH LEUK'.

TREASURER'S REPORT.

December	17, 1886.	Adolph Leué, salary as Secretary	$100 00
	29, "	Adolph Leué, postage, etc	20 50
	29, "	Leo Weltz, expenses	8 50
	29, "	J. B. Peaslee, expenses	10 90
January	5, 1887.	Central Ohio Paper Co., stationery	6 65
	29, "	H. Wilson, postage, etc	25 25
February	5, "	Siebert and Lilley, binding reports	21 30
April	23, "	Leo Weltz, expenses	71 20
	23, "	Adolph Leué, salary and expenses	130 15
July	13, "	James Poindexter, expenses	7 00
	16, "	J. B. Peaslee, expenses	3 00
	19, "	Leo Weltz, expenses	14 30
August	11, "	Adolph Leué, salary as Secretary	100 00
	12, "	H. Wilson, postage	6 40
	17, "	Henderson, Achert & Co., seal	11 00
September	12, "	Leo Weltz, expenses	3 50
	12, "	James Poindexter, expenses	15 00
October	1, "	Leo Weltz, expenses	50 00
	25, "	Adolph Leué, salary as Secretary 3 months	100 00
	25, "	Adolph Leué, bills paid	50 65
November	30, 1887.	Adolph Leué, salary and expenses	139 00
	30, "	James Poindexter, expenses	16 62
	30, "	Leo Weltz, expenses	53 00
January	11, 1888.	Leo Weltz, expenses	18 00
	11, "	Wilmington Journal, advertising	12 00
February	9, "	J. B. Peaslee, expenses	11 30
	9, "	Adolph Leué, expenses	20 00
	9, "	Leo Weltz, expenses	15 00
	Total		$1,040 22

By balance of appropriation in State Treasury	$63 52
Received from former Treasurer	76 07
State appropriation for 1888	1,500 00
Total	$1,639 59

Respectfully submitted.

JAMES POINDEXTER, *Treasurer.*

MEMBERS OF THE BOARD.

	Commission expires.
LEO WELTZ, *President*	April 27, 1889.
DR. JOHN B. PEASLEE, *Vice-President*	April 27, 1891.
REV. JAMES POINDEXTER, *Treasurer*	April 27, 1893.

ADOLPH LEUE', *Secretary.*

ANNUAL REPORT.

THE FORESTRY QUESTION IN OHIO.

TO THE BOARD OF DIRECTORS OF THE STATE FORESTRY BUREAU.

By ADOLPH LEUE', *Secretary.*

The great problem which the people of the country are called upon to solve is, as I stated last year: *To perpetually keep a certain percentage of the superficial area of our country in forests, properly distributed, and to use and husband this in a manner that its usefulness be unimpaired.*

According to the difference in the existing forestal relations, the question presents itself to the people in a different form—

1. In sections thickly wooded, as in portions of the North, South and West, the question is, *to reduce the wood-land area.*

2. In sections bare of trees, as are our vast prairies, the all-important question is, *how to raise forests.*

3. And in those sections which are tolerably well wooded, as in Pennsylvania, Kentucky, Indiana, and our own State, *Ohio*, the chief question is, *to preserve and properly manage existing wood-lands, and to reforest so much of denuded lands as the agricultural and industrial interests of the State demand.*

The neglect of this question involves a speedy annihilation of our existing forests. In spite of everything which has been done by private individuals and by the State, to educate people in matters pertaining to forestry, our wood-lands are decreased in size and deteriorated in condition. Forests spared by the ax and by fire are ruined by insects and by domestic animals.

The question this Board should seriously consider is, *what should the State of Ohio do to counteract the tendency of forest annihilation?* A reduc-

tion of the tax on wood-land or the exemption of wood-lands from taxation has been proposed. Legislation in this direction would certainly be a powerful incentive to preserve existing wood-lands and to create new forests. It is, therefore, not at all strange to see the friends of our wood-lands and even farmers to raise this question, and to advocate the passing of laws exempting all wood-lands from taxation.*

Though I have spoken of this on previous occasions, let me repeat it, that a law exempting wood-lands from taxation has been found to be unconstitutional. Any steps taken to secure the passage of such a law is a waste of time and energy.

The friends of this measure then proposed a change in the Constitution, that such a law might be enacted. Suppose that such a change be made, which is, however, not at all probable, the question arises, *how would such a law affect other interests, especially agriculture?* Very seriously indeed, for the burden of tax would necessarily be thrown upon agricultural lands, and the farmer who owns but a few acres would be the sufferer; for he cannot afford to wait for returns which forestry offers; he must keep his scanty means in circulation. But aside from this there is no good reason why forests should be exempted from taxation, for practical forestry, it has been shown, is a remunerative occupation. True, quite a number of farmers, who have tried their hands in forestry, failed to realize any profits—so they have in agriculture. Such failures, if they illustrate anything, show the great need of information in practical forestry. It is to be hoped that no further efforts will be made to exempt wood-lands from taxation.

In regard to the question, *should a tax be levied to pay premiums on forest-plantation?* let me say, that several States have done it, and the effect has been a good one, inasmuch as it became an incentive to the planting of forest-trees, and in calling attention to the necessity of planting forests. The result of gaining experience, too, was worth something. But at the present day, when the need of practical forestry is felt everywhere, and when artificial means of bringing the matter properly before the people are needed no more, there seems to be no reason why the State should pay a premium for what is known to be a paying investment.

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*The latest movement in this direction which has come to my knowledge, is a memorial to the Legislature of this State, which was circulated among the farmers of Clermont county, of which the following is a verbatim copy:

To the General Assembly of the State of Ohio—

GENTLEMEN: In consideration of the effort making to preserve and increase the forest area, and to the more surely accomplish said purpose, as well as to relieve the farmers of unjust taxation, we, the undersigned, tax-payers of the State of Ohio, do hereby petition your "Honorable Body" to enact, at your earliest convening, such laws as will exempt from taxation all lands (in the State of Ohio) occupied by forest-trees, and also all that portion of farm-land included within the limits of any township, county, or State road.

In this matter of forest legislation it should be remembered that *the best laws in the world will not protect the forests or advance the forestry interest where an intelligent management of forests is wanting.* The forestal affairs are known to be best in those countries which have the best educated foresters. In due recognition of this, the different countries of Europe have established schools of forestry, some of which are isolated academies, some are connected with universities. These institutions are, as a rule, well equipped with libraries and scientific instruments, and the graduates of such institutions are in rank equal to those from universitias.

The necessity of establishing such schools in this country has been felt and advocated by men whose sagacity is beyond doubt. At the beginning of this decade the Congress of the United States was petitioned to establish a national school of forestry; but to no effect. State legislatures, too, have been asked to provide for the establishment and maintainance of at least one such school, but to no effect. State legislatures, too, have been petitioned to provide instruction in forestry in the schools of agriculiure, with no better result. In every instance the chief cause of failure was the false assumption that the forestry interest would take care of itself.

True, our State owns no forests, yet it would be as preposterous to maintain that consequently there is no need of, or use for educated foresters, as it would to say, as the State owns no agricultural lands, it has no use for educated farmers.

Men like Cassius M. Clay advocate that, by the right of eminent domain, every State should prevent the ruthless destruction of wood-lands, and cause certain denuded regions to be re-afforested; even more, that it is *the duty* of the States to do this. To intelligently and successfully effect such measures, there is a need of a corps of men educated in all the branches of forestry.

Thousands of acres of land are lying waste in the State of Ohio, and are thus practically unproductive. If these were turned into artificial forests, not only the respective owners but the State at large would be benefited. The State can promote this in no better way than by furnishing the means to educate men who will become instrumental in turning this now *unproductive* into *productive* lands, and in developing a rational system of forest-management; and the State may do this *by establishing a forestry department at our agricultural college.*

In the meantime the Bureau should continue to collect facts of interest to forestry, and to make them known through the annual reports.

A JOURNEY OF THE OHIO STATE FORESTRY BUREAU THROUGH A PORTION OF CLINTON COUNTY, O.

On the 8th of July, 1887, at 7:30 A.M., standard time, Dr. John B. Peaslee and myself left Cincinnati for Wilmington, by the Columbus Midland Railway, to attend a meeting of the Ohio State Forestry Bureau, to be held at that place.

I pass over the description of the pretty hills and fertile valleys, with the many flourishing villages and towns, and the often very prettily situated, handsome country homes on both sides of the road. Nor shall I speak of the barren hillsides and those several human habitations around or near which no tree or shrub is to be seen. Suffice it to mention that in not a few places the need of a frequent and prolonged observance of Arbor Day is plainly visible.

The effect of the prolonged drouth was visible everywhere. The corn-fields and pastures were badly in need of a good rain.

The distance between Cincinnati and Wilmington is fifty-six miles; we traversed it in about two hours.

Upon our arrival we were met by Mr. Leo Weltz, who informed us that the meeting would not be held at Wilmington, but at the residence of Mr. C. B. Vanniman, about five miles east of Wilmington.

As the carriage which was to convey us thither was in waiting we had neither time nor opportunity to see anything of Wilmington beyond what was to be seen from the station, and this is, as everybody who has been in Wilmington can testify, not well calculated to impress one favorably, except the school-house south of the railway station and the high school building, an elegant structure, southeast of the station. We thus entered the vehicle, and away we went on a solidly constructed and well-kept turnpike, one of the best to be seen in the State of Ohio.

Mr. Weltz proved himself to be an excellent guide; he seemed to know every foot of ground we traversed, and the owners thereof. When we were about a mile from town we were informed that all the land on both sides of the road belonged to Mr. Rombach. Reader, if you wish to see a well-kept farm, taking the term "well-kept" in its widest meaning, go and see Mr. Rombach's. It embraces about fifteen hundred acres, is laid out in sections, all well fenced. If you want to see good live stock in a good condition this is the place to visit. We saw but little of it, but what we saw reminded us vividly of the seven fat cows

which Pharaoh of old in a dream saw emerging from the Nile. On the north these extensive fields are bounded by the railway, on the south by what from the distance seemed to be a well-wooded forest, which, we are told, is a part of Mr. Rombach's estate. A visit to these woods, profitable as it might have been, was not on the programme of our tour.

About two and a half miles east of Wilmington we drove through a lane to a small grove of black walnut, intermixed with kickory trees, planted by Mr. Rombach. It embraces perhaps five acres. The trees are thriving well, and range in age from eight to twelve years, with a few of perhaps fifteen years; are mostly raised from nuts planted where they grow. We did not measure any, but to judge from appearance the oldest and largest were about eighteen inches in circumference, while the youngest would measure about eight inches.

The grove made a fine appearance, but, looked at from a forester's stand-point, it has one serious defect; the trees are too far apart. If the grove contained double the number of trees, or even more, the individual trees would have been forced to a greater height, and instead of developing into a fine, leafy head or crown, they would have made a long, straight trunk, which is the great desideratum in timber-trees. As the trees now are they would be admirable in the park, or the lawn or on the roadside where shade and beauty of form is the chief or only object.

Having returned to the road we again drove eastward. From about this grove east the roadside is partially lined with forest-trees, among which the Lombardy poplars attracted our attention, because it seems rather strange to see these trees planted in preference to a great number of indigenous trees, which are more beautiful and more valuable. Elms, maples, blackberry trees, black walnut, and about five varieties of oaks were observed on the roadside or on the fields near the road.

Now as to the alleged evil effects of trees on the roadside. Upon the road I saw none. That portion of the road the sides of which were lined with trees was fully as good, if not better, than the remaining portion. The only improvement of the road that might be suggested is that, on Ohio's next Arbor Day, the entire road be lined with trees. There can probably be no objection to utilizing fruit-trees in making the proposed improvement. Trees along the roadsides are an ornament to the landscape and a great benefit to the wanderer.

None of us did, as far as I know, take any note of time; I can therefore not tell how long it took us to drive from Wilmington to the farm of Mr. Vanniman. Be it sufficient to say that we arrived there. A little later Mr. Vanniman, who had gone to Melvin, the

nearest station on the Columbus Midland Railroad, to meet the Rev. James Poindexter, the lately-appointed member of the Forestry Bureau, drove up.

Mr. Poindexter, who is pastor of a church in Columbus, is a man of medium size, sixty-seven years of age, wears long, silver-white hair, and is, in spite of his advanced years, strong and very active, which latter qualities he attributes to his temperate habits; for he does not drink anything stronger than tea and coffee, and does not care for that when he can have plenty of good water. He used to take great delight in smoking a good cigar, but cares for it no more. Mr. Poindexter is thoroughly convinced of the great importance of the Forestry Bureau, and will do anything that may tend to advance the good cause for which we assembled.

Immediately upon his arrival the Board went into session. About 2 o'clock the Board adjourned. We at once took seats in the carriages which were waiting and were ready to start, when an incident worthy of notice occurred. Mr. Peaslee, who had been very much pleased at finding among the great variety of trees that had been planted about the residence of Mr. Vanniman two specimens of the mountain ash, which, he said, were very abundant and grew to perfection about his old home in New Hampshire, asked Mr. Vanniman for the name of this place. "It has," he replied, "not yet been named, and should be pleased to have you gentlemen name it." Among the several names which were proposed it was at last named Tharandt.

It may not be generally known that Tharandt in Germany is the seat of the oldest and one of the most renowned forest academies in the world, and that this academy, through its illustrious director Oberforstzath, Dr. F. Judeich, planted in this forest a group of Catalpa speciosa sent by me early in 1882, which, as Dr. Judeich wrote, "shall forever be sacred to the 27th of April, Ohio's first Arbor Day." In due recognition of this fact, and to return the compliment which that renowned academy paid to the State of Ohio, the Ohio State Forestry Bureau named the residence of Mr. Vanniman Tharandt.

We then bade farewell to Tharandt, O., and, accompanied by Mr. Vanniman, we went further east and came to the farm of Mr. C. E. Custis, which the Bureau afterward called Catalpa Grove.

Southwest of his residence and along the road Mr. Custis had planted a grove of Catalpa speciosa, in which he evidently takes great pride. We found this gentleman busily engaged among his trees. The grove occupies about two and one-half acres of ground, which is entirely level, like all the land of the farms through which we passed. It was planted at three different periods, namely, 1882, 1885 and 1887.

The trees planted in 1882 were raised from seedlings, then mostly one and a few two years old. Of all the trees planted not one was lost. Unfortunately they were not planted as closely as they should have been. Planted as they are in rows fourteen feet apart and twelve feet apart in the row, the trees, having the full benefit of light and plenty of room to expand, developed strong side branches, and pruning became necessary. The trees made a good growth, have an excellent head, but will hardly make good timber. Upon being asked what money value he put on a single tree, Mr. Custis said that he had never considered that question, but one dollar apiece would not buy them.

The next section was planted more closely, the rows being seven feet apart and the trees seven feet apart in the row. They were planted in 1885, were then one year old, are therefore now in their third year, and have reached a height of from three to four feet. Here, too, pruning became necessary, showing the necessity of still closer planting. To shade the ground and to thereby prevent the growing of weeds, beans were planted among the trees, evidently with good result. It is worthy of note that also in this section no tree was lost.

On the third and last section Mr. Custis is raising seedlings for transplantation next year. Seeds were sown in rows between corn this spring. The young seedlings are now about three inches above ground, and appear to be in a good and healthy condition.

On the way to our next station, which was Mr. Frank Stevens' grove of black locusts (Robinia pseudacacia, L.,) we had an opportunity to see the ruins of a once beautiful forest, destroyed by a cyclone which swept over this region on May 12, 1884. It was a sad spectacle. Oaks, hickories, elms, etc., of from one to two feet in diameter, were uprooted or broken at two, four, six or more feet above the ground, by that hurricane, which must have been fully as furious as that which a year later wrought that dreadful destruction at Washington C. H., in Fayette county.

Mr. Frank Stevens' grove of black locusts occupies a small area of perhaps one acre of ground. The trees, which stand very close to one another, almost forming a dense thicket, are from twelve to fifteen feet high, with trunks of about four to eight inches in circumference, and are entirely free from injuries by the locust borer.

About a mile west of this is another grove of black locusts belonging to Mr. Robt. Skimming. This plantation is, I think, about two years older than that of Mr. Stevens', and is planted less closely. The rows about six feet apart, and the trees about six feet in the row.

The grove occupies an area of perhaps two acres, and contains not a single tree which is not badly infested with the locust borer. The

entire grove presented the appearance of decay. Some trees were, what is familiarly called, honeycombed, so that even a slight bending would break them.

There can be no doubt as to the fact that the entire grove is irrevocably lost, and that even if through much labor some trees may be saved, it would hardly be worth the time and expense of such an attempt.

As frequent inquiries are made regarding the locust-borer, about which there seems to be a diversity of opinion, a few words as to its natural history will not be considered out of place.

This insect, which entomologists call *Clytus Robinia* (Foster), *Clytus pictus* (Harris), is a capricorn beetle, velvet black, ornamented with tranverse orange yellow bands. These beetles appear about the beginning of September. The female deposits her eggs in the furrows and crevices of the bark. The eggs are soon hatched. The grub then bores into the bark, devouring the inner portion thereof. During the winter they are in a torpid state. Early in spring they resume the work of destruction by boring through the sapwood even into the heart of the tree. Towards the end of July, about the 20th, they are transformed into pupæ, out of which they come forth as beautiful beetles early in September.

Taking into consideration that there are thousands of these larvæ now in that grove, which to kill by application of washes or by hand would be next to impossible, it would seem that the best thing to be done would be to cut every tree in that entire plantation, and to burn them before the changing into a perfect insect takes place.

This was the last plantation we had time to visit. The road on which we returned to Wilmington was fully as good as that on which we traveled in the morning. The fields on both sides of the road showed evidence of great fertility and good husbandry. It is worthy of remark that on the entire tour we did not see a single silver poplar, which has become a nuisance in and around Cincinnati. And of that ill-reputed native of China, called *Tree of Heaven* or *Ailanthus*, we saw two specimens, which we consider just two too many.

Arriving in Wilmington but a few minutes before our time to leave we had no opportunity to either verify or correct the impression which the place made upon us in the morning.

ADOLPH LEUE'.

A JOURNEY IN THE WOODS OF BUTLER COUNTY, OHIO.

By ADOLPH LEUE', *Secretary.*

The oldest, best, and indeed only reliable work on Forestry of Ohio is about exhausted. Upon special inquiry it has been ascertained that there is no perfect copy in existence. But there are a number of volumes in various parts of the State. These are, however, more or less dilapidated, so that it is only by comparing two or three and sometimes more volumes that we are enabled to find the meaning of certain passages.

An attempt to prepare a new edition has met with but little success and less encouragement. Some of the editors have died in the midst of their labor, and others have abandoned it.

In the course of time the old edition will grow less, which will make the new revision still more difficult. The reader will therefore not wonder that learning of the existence of a tolerably well-preserved volume about seventeen miles north of Cincinnati, not only aroused my curiosity but created a very strong desire to see and to spend a few hours in the examination of the same.

My esteemed friend, Dr. John B. Peaslee, whom I acquainted with this fact, and my intention to see this old volume, was so much interested in the matter that he concluded to go with me.

The first fine day was set apart for the journey. On the morning of the 28th of August, 1887—lazy people were still sleeping, and the pious prepared to go to church—we took the train on the Cincinnati, Hamilton and Dayton Railroad and sped towards the previous volume.

At Jones Station we left the train and hurried northward on a rather dusty road, which, it is to be hoped, will be so no more, when the silver or white maples planted on its side shall have attained sufficient size to give shade. After having traveled about a mile and a half we reached the home of Mr. John Windisch, who, having learned of the object of our visit, informed us that the treasure we wished to see was not there, but on his Vinton-road farm, about three or four miles distant.

While we were shown his well-filled barn, and his very conveniently arranged stables, etc., a phaeton was brought out, which Mr. Windisch said would convey us to wherever we wished to go. And a few minutes later we found ourselves again on the road, Mr. Windisch, jr., driving. The corn-fields, upon which the severe drouths of this season seemed to have had no effect, gave evidence of good farming as well as of the richness and fertility of soil in this region.

The absence of trees and wood-lands on either side of the road was painfully conspicuous. A small cluster of trees surrounding the farm-houses, and at greater or less intervals, single rows of from four to eight black-locusts either dead or dying, here and there a sycamore, a black-berry tree, a sugar-maple, and even a solitary black-walnut was all that was left of the dense woods, which, less than a hundred years ago, covered the whole region.

At last we reached the place of our destiny. We left Vinton road, and turning east, we passed the well-built farm-house, and there before us we beheld a magnificent grove covering about eighteen acres, fifteen of which are in natural woods.

This is the great volume we wished to see and to study; for, be it remembered, the best and most reliable work on forestry is the forest. This special patch is, as might be expected, not a forest primeval, for here, too, decaying stumps indicate the woodsman's track. Yet there are trees there which measure about three feet in diameter, with trunks of from seventy to one hundred feet high, mostly sound. The predominant trees of this grove are beech, hickory and sugar-maple; besides these, there are some very fine specimens of white and red-oak trees, and two or three of Kentucky coffee-nut-trees of an exceeding height; one of the latter had been struck by lightning and shows signs of decay. Although cattle have occasionally been allowed to roam through this grove, there is quite a vigorous new growth of young trees coming up, which should be protected. To give this young growth a better chance for development, the old trees, which have about reached maturity, should be removed. Under no circumstances should the ground now occupied by this grove be utilized for any other purpose except forestry. Paradoxical as it may appear to some, I can not suppress my fears that our extensive fertile fields, and the general adaptedness of the land of our State for agricultural purposes, which we are accustomed to look upon as being a great blessing, will ultimately become our curse. The value of our timber, together with the great fertility of our soil, is too great an incentive for the average farmer to remove the trees and to utilize the land for any other except forestal purposes. In the interest of the future prosperity of our fair State, one is tempted to wish that

there were more portions of Ohio unfit for agriculture proper. Mr. Windisch is exceedingly fortunate in having such a portion of land not well adapted for the production of ordinary farm crops, (it would be better if it were about five or six times as large as it is), and it is to be hoped that he will take advantage of the opportunity to distinguish himself as a practical forester.

On either side of this natural wood is found a plantation of black-locust trees, Mr. W.'s attempt at the new edition of the work on forestry, spoken of at the beginning of this chapter.

About ten or fifteen years ago, and even earlier, quite a number of black-locust plantations were formed in south-western Ohio. These plantations, though they were all on a small scale, may be considered as the first efforts at practical forestry, or the growing of forest-trees for profit. That these plantations did not prove profitable to the planter, is to be regretted. Of all those plantations there is probably not one which is not more or less injured by the locust-borer. One of Mr. Windisch's groves occupies about one acre of ground, and the other perhaps three. The trees in one are fourteen years old, in the other ten. In each about 50 per cent. are dead; 25 per cent. will be so within a year or two, and the remainder, some of which are from 6 to 7 inches in diameter, may, perchance, live for several years, but none will become an old tree, for there is not a single tree free from injury by the borer. The so-called leaf-eater was observed on but two trees.

Although these early plantations resulted in great loss to the planter, they are of value to the science of forestry, in that they teach us how *not* to proceed. And this is a gain.

There are, as far as could be learned, no *clear locust plantations* in this section of the State which are not infested by the borer. I have on previous occasions demonstrated the fact that this insect (Clytus pirtus, also called Clytus Robiniæ) delights in sunshine, and abhors darkness and shade. The very thin foliage of the locust tree does not produce sufficient shade, however closely they may be planted, to disgust the borer; therefore, *clear locust plantations are a failure.*

But the Black Locust is too valuable a tree to thus lightly abandon its culture. How to proceed in the cultivation is a question which remains to be determined by a series of experiments, for the performing of which we stand badly in need of Forestal Experiment Stations. In the meantime, it is well enough to form plantations consisting of Catalpa, Ash and Black Locust. I propose this mixture because the Black Locust grows more rapidly than the other two mentioned species, and will thus have the sunlight from above, and having a thin foliage, it will not materially injure the other trees by its shade. The Catalpa

and the Ash have a foliage sufficiently dense to shade that portion of the Black Locust which the borer generally infests.

But these ruined plantations teach another important lesson, namely: *In forming the plantation, plant closely, and not as far apart as you would have the trees stand twenty years or more hence.*

In Mr. Windisch's plantation the trees were set out 7 by 7 feet. Planting at such a distance induces the seedlings to develop side branches, which often necessitates pruning, an operation which should be rendered unnecessary in forestry. Close planting will prevent the development of larger branches, and the young trees will form a straight trunk, which is indispensable in timber trees.

The exact distance at which the different forest-trees should be set out, remains to be determined. At present various distances are recommended. As these recommendations do not rest upon the sound basis of comparative experiments, but upon speculations only, they should be accepted with great precaution, and not as infallible truths.

It was already past midday when we left this grove; and as we approached the farm-house already mentioned, Mr. Peaslee turned around, and, with a lingering glance upon the woods we had left, he seemed to bless the man who had "spared" this one of "God's first temples," and then looking upon that robust man, who was opening the gate, and who might pose for a woodman, he whispered something like

"Thy ax shall harm it not."

About one o'clock we arrived at the Windisch homestead. Hearing the account of the condition of his Locust plantation, Mr. John Windisch was anxious to see one of those dreadful enemies. Now, near the fence there were standing a few Locust trees about five years old, which showed unmistakable evidence of being infested by the borer. A hatchet and a hand-saw were brought out, and in a few minutes one of the trees was cut down. A piece of the stem one foot long was sawed off and split, and in a short time we extracted from that piece four nearly perfect beetles (*Clytus Robiniæ*), each having, as a larva, made a hole of from four to five inches in length, with a diameter of one-eighth inch. Considering now that a single tree contains perhaps from twenty to forty or more of such insects, and each making such an ingress into the wood, the extent of injury done to the plantation in one single year is most fearful to contemplate.

Suppose the trees were planted eight by eight feet apart. One acre would contain 680 trees, which, at the age of 18 years, would furnish at an average, one railway tie and two fence posts each, or 680 ties, and 1,360 fence posts to the acre. Railway ties of the Black Locust will

bring at least thirty-five cents each, or two hundred and thirty-eight dollars for the whole. Fence posts are about seventeen and one-half cents each. The 1,360 posts would bring two hundred and thirty-eight dollars. The receipt for ties and posts would amount to four hundred and seventy-six dollars. Branches and tops for stakes and fuel will pay for the labor of cutting and hauling. This is the very lowest estimate of the actual value of a Black Locust grove in a sound condition. To ascertain the loss sustained by the injuries of the borer, we must deduct the value of the grove in its present sad condition. As timber the wood is useless. As fuel, it would at best furnish nineteen cords of wood. At four dollars a cord we would have seventy-six dollars per acre, which places the loss at four hundred dollars per acre. If we now suppose that within the State of Ohio there are two hundred acres of Black Locust plantations, which, it will be admitted, is a very low estimate, then the total loss would be $80,000. This, however, is only a very small beginning at practical forestry, and under existing circumstances it may be confidently expected that similar losses will occur in other attempts.

As yet no practical means of combating the evil are known. The remedies recommended, such as lotions of different kinds, may be applied in limited cases, but on large plantations these remedies are utterly impracticable.

But I must leave this question and return to my narrative. While we were examining the ravages of the borer on the tree we had cut down, we were informed that dinner was ready. It is needless to say that, by this time, it was about 2 P.M., we were also ready for dinner, and that our kind host's Bavarian cook had fully anticipated this, as was plainly indicated by the great abundance of good things placed before us.

After dinner we inspected Mr. Windisch's ornamental plantation on the spacious ground surrounding the magnificent mansion. No fault can be found in the choice of varieties, though a little change in the grouping might, in the course of years, be necessary.

It must have been about 3 o'clock when the phaeton, in which we rode in the morning, and which was to convey us to the natural grove belonging to Mr. H. Muhlhauser, was brought out again. Now, a phaeton is a light-wheeled vehicle, which is certainly ill-adapted for four full-grown men ranging in weight between 130 and 180 pounds. I had viewed it in the morning with some suspicion, and confess that I was a little alarmed when Mr. Windisch, sr., asked the question, who of us was the heavier? When it was ascertained that Mr. Peaslee was weightier by more than 20 pounds, he was asked to take the front seat, which he did. Mr. Windisch, jr., and myself took the back seat,

and Mr. John Windisch, who was to act as driver, took the seat along side of Mr. Peaslee. We started. The sight of the fields and trees soon engaged my entire attention, so that my original fear about the phaeton was allayed. At Jones' Station we passed the railroad and proceeded on a country-road in a southerly direction. A little north of a place called Muhlhauser's, we turned into a lane, and after a ride of about one mile left the phaeton, and walking over a field reached Mr. Muhlhauser's natural woods, a really magnificent grove, consisting chiefly of stately beeches interspersed with sugar-maples, hickories, oaks, ash, a few elms, and one coffee-nut-tree. The whole presented the appearance of a beech Hochwald (seed-forest). Here, as in the forest seen in the morning, an undergrowth of young rock-maples, beeches, chestnut-oaks, and a few other trees are coming up. Within a few hours a wagon-load of choice young seedlings might be taken up late in autumn for transplanting into nursery rows, provided cattle be excluded.

West of this wood, and adjoining it, is another, in which the underbrush is so very dense that, at places, it is absolutely impenetrable. We followed a foot-path and went into it quite a distance. Briers and other forest-weeds grow very luxuriantly there and smother the young trees, which would come up and take the place of those now ready for the ax. Such a neglected wood-land, which painters and poets would take great delight in seeing, fills the heart of the forester with grave apprehension. Should a fire break out in this wood, it would be next to impossible to extinguish it. This thick underbrush, with the dead branches of wood hanging in it, would so feed the flames, that nothing could prevent the complete destruction of this and the adjoining forest. When will our Legislature begin to enact laws that shall compel owners of wood-land to reduce the danger of forest-fires?

Mr. Peaslee, who is an ardent admirer of flowers, had, on our way, gathered an immense bouquet of forest-flowers, which induced some one to ask him whether he had a contract for decorating Music Hall.

As the time for our return to Cincinnati was nigh, we left the woods, took seats in the phaeton and hastened towards Muhlhauser's Station. As we were leaving the main road and turned towards the station—a crack—and by the law of gravitation one of us found pimself on the ground. The right hind-wheel was broken. Thus ended our journey into Fairfield township, Butler county, State of Ohio.

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In consideration of the fact that we, as a people, are just beginning to feel the great importance of due attention to forestry, it is not surprising that there is a great lack of information in matters pertaining to the art and science of raising trees for shelter, for ornament and for profit. It is, however, encouraging to notice a constantly increasing desire for knowledge in all branches of forestry. To facilitate the study of forestry, and to stimulate the directors of libraries to add to their collections of works on forestry, at least all the public documents, which almost any library may readily obtain by simply asking for the same, the librarians of public libraries were asked by letter to furnish for publication in this report a list of books on forestry found in their respective libraries. Most of these functionaries did not reply, quite a number replied by stating that they had no works on forestry, while a few courteously furnished a complete catalogue of all the books they have on this subject, which I hereby gratefully acknowledge:

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TOLEDO, OHIO, *September* 7, 1887.

MR. LEUE'—*Dear Sir:* In reply to your reqnest for a list of works on *Forestry*, in the Public Library of Toledo, I send the following:

By Brown, Dr J. C, of Edinburg, Scotland:
Finland, its Forests and Forest Management.
Forestry in Norway, etc.
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Respectfully,

MRS. F. D. JERMAIN,
Librarian.

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TREE-PLANTING ON STREETS AND ROADSIDES.

Although the planting of trees on streets and roadsides is, strictly speaking, not a question in forestry, it is, nevertheless, one of the most powerful means of advancing the cause of forestry, inasmuch as it stimulates tree-planting, which, if properly conducted, will indicate what may and what may not be grown in a given region. In due recognition of this, tree-planting on streets and roadsides should have the fostering care of all friends of foresty. As this subject has been treated quite extensively in our last annual report, we confine ourselves to the giving of a few additional extracts from some of the best writers on this question.

Francis George Heath, Esq., an authority recognized both in Europe and America, says:*

"Why is it that reforms which are healthful and beautiful, and in every way desirable, are so slowly effected in this age of civilization and progress, of culture and freedom? People are content to go on from day to day, from week to week, from year to year—nay, sometimes for a generation—in irksome discomfort, and under conditions which injure the body, and sorrow, depress, and dwarf the mind, without even a thought of the simple expedients, by the adoption of which the entire scope and tenor of life might be changed. And usually when, by the very slow progress of ideas something has been discovered to make life a little more pleasant, we hail it as a 'happy thought' or a great discovery, and seldom reflect that it is our want of thought which has prevented its earlier adoption. A hundred instances of the very slow development of our ideas could easily be given; but all except one would be beside the immediate purpose of this chapter, which is to inquire why it is that we have been content, and still, in too many instances, remain content, with the unloveliness, the unhealthiness, the ugliness of so many of our cities and towns?

"There has happily been something like a popular awakening to the ugly aridness of our towns during the last two or three years, and this change in public feeling has led to the conviction that something might be done to make the places where we spend by far the larger portions of our lives somewhat more enlivening and attractive by the planting of trees in public thoroughfares. But how little has actually been done to carry out so delightful a reform! Indeed, in no instance that has come within the author's knowledge, has it been contemplated anywhere by public authorities† to do more than plant one or two of the broadest and longest of

*Our Woodland Trees, London, 1878, p. 261, etc.

†There are happily a few exceptions in this country, notably the city of Washington, D. C.

town thoroughfares, or to make the very cautious 'experiment' of filling up a few odd corners and angles by planting trees. Money, though spent with little regard to economy in other and far less worthy objects, is grudgingly doled out for the purpose of tree-planting in a few town streets; and even the small sums that have thus been spent have in too many instances been secured for their excellent object only by the earnest and persistent exertions of large hearted individuals amongst our local governing bodies, and in spite of selfish, obstinate and narrow-minded resistance.

"But why, it may be asked, can not there be a healthy and spontaneous expression of public opinion on this subject? Why can not it be recognized that townspeople would immensely gain both in health and in pocket by an extensive adoption of town tree-planting? Why will not people see that much of what they spend in poor-rates might be saved by the introduction of more trees into towns. Trees are sanitary agents, more efficient and more persistent than public officers of health. They absorb the noxious compound known as carbonic acid gas, reduce it to its simple and healthful elements of carbon and oxygen, assimilate the carbon by making it contribute to their substance, and hence to their life, vigor and beauty, and give back pure oxygen—our vital air—for the healthfulness and pleasure of mankind. How beautiful, indeed, is this function, whereby a deleterious gas is turned to double advantage of human beings by the operations of trees! We not only benefit by what is returned to us, but by what is retained to aid the tree growth; for, as the corbon assimilated by the tree is made to contribute to the protection of its most beautiful, most useful and most enduring qualities—to the charm of its graceful foliage, to clustering profusion of its fruit and to the solidity and stability of its timber, so, for the same reason, it ministers to the further enjoyment of man by providing him with food in health, with medicine in sickness, with shelter to temper the heat of the summer sun, or the icy chill of the wintry wind, and with that inexpressible sense of pleasure conveyed to the mind through the eye by the presence of noble stem and spreading of graceful twig and clustering foliage."

While in some towns and cities of Ohio a very laudable beginning at tree-planting on streets has been made, there are still many places which are conspicuous by the entire absence of trees on streets. In direct contrast to such stands our National Capital, the city of Washington, which has duly become famous for its beautiful avenues of trees. "In no city in the United States, and perhaps in the world, has arboriculture, as a means of urbane embellishment, been more intelligently employed and with more gratifying results than in Washington," writes a correspondent of the *Philadelphia Times*:*

"The favorable spring weather has developed all the natural beauties of the choice selection of deciduous and evergreen trees and shrubs which beautify not only the great parks, squares and circles of the capital, but the curb lines of the broad aveunes which sweep up in beautiful ranges of vision towards the massive public edifices or form magnificent vistas along streets busy with the activity of trade. The work of the Park Commission, under the auspices of the municipal government, composed of W. R. Smith, superintendent of the botanic garden; William Saunders, superintendent of the gardens of the Department of Agriculture, and John Saul, began in 1872, thus affording fourteen years of practical test of the sagacity of their plans, and the fruits of their labor. Washington, even in this brief space, surpasses Paris, Vienna, or Berlin in the number, variety and beauty of its trees.

*Quoted by the Colorado Farmer, August 12, 1886.

"In the commencement of their work the Commission selected trees possessing stateliness and symmetry of growth, expansive foliage, early spring verdure, and autumnal variety of colors. In order to secure a reliable and abundant supply of the best varieties and healthiest growth for the future, a propagating garden was also established in one of the public parks, occupied by the penal and reformatory institutions of the municipality, which now contains sixty thousand trees of the varieties used, in different stages of growth, from seed, to four and five years.

"The returns of the superintendent and his assistants report ninety thousand trees along the curb lines of the avenues and streets, in thriving condition, and ranging from five to twenty-five years' growth, which includes the old trees of common varieties, generally Cottonwoods, which were standing when the systematic aboricultural adornment of the Capital began. The number stated does not embrace the artistic groupings and groves of trees in the seven hundred acres of beautiful public parks of the city.

"Some idea may be formed of the extent of the lines of the trees now shading the avenues and streets, when it is stated that if all the trees were stretched out in two rows they would form an unbroken vista from Washington to Baltimore, Philadelphia, New York, and nearly half way to Boston, or if in a single row, would reach from Washington to within 150 miles of Chicago. The annual plantings add from two to three thousand to the number of the year before. The varieties which have been found best suited to streets are: the Ash, Catalpa, Coffee, Cypress, Elm, Maiden's-hair, Gum, Horse-chestnut, Linden, Locust, Maple, Oaks, Poplar, Sycamore, Tulip and Willow, according to localities.

"The plantings have also been made with proper regard for certain objective features; for instance, the famed 'Unter den Linden' of Berlin is less than a mile in length, and now more appreciable in history than in reality. The 'Unter den Linden' of the American Capital is Massachusetts avenue. This superb sweep of residences, statues, and fountains, and even through its more sparsely settled portions to its terminus on the banks of the Anacostia, presents four miles of vigorous and stately young Lindens, twenty to thirty feet high. The connections with streets and avenues similarly planted will, within a few years, give the 'Unter den Linden' of Washington a circuit of twelve miles. The other avenues and streets, whether devoted to business or residence, have also their characteristics of foliage. The Maples and Catalpas of Pennsylvania avenue, the Elms of New Jersey, New Hampshire, New York, and Delaware avenues, the Tulips of North and South Capital streets, the Meridian of the United States, the Maples of Maryland, Connecticut and Vermont avenues, and the Poplars of Virginia avenue give but a partial idea of what the trees of Washington will add to the landscape effects of the nation's Capital in another decade."

For the benefit of those city authorities as well as private individuals, who may contemplate following the noble example of the city of Washington, I quote from the Washington correspondent of the *Cincinnati Times Star.** The writer says:

"The history of a tree depends almost wholly upon the skill and pains bestowed upon it at planting. A street having been designated for setting, holes are dug at intervals of twenty-five or thirty feet, according to the variety of the tree, from which three cart-loads of dirt are removed and carted away. The trees are then brought from the nurseries in a wagon especially built for that purpose, care being taken that the roots shall not become dry. The tree is deposited in the hole,

*October 31, 1885.

which is then filled with three cart-loads of good soil, prepared and enriched for that purpose. As each tree involves the handling of six cart-loads of soil, which must often be conveyed long distances, and at an average expense of 50 cents per load, the main expense is not in the tree itself, but in the planting.

"It is, also, often needful to water the newly-planted trees during the dry heats of summer. With such careful and scientific treatment, the loss reaches the figure of two per cent., and the entire cost of an established tree is found to be less than three dollars.

"The favorite and best shade tree, evidenced by experience and popular approval, is the Maple, of which seven distinct varieties are planted.* Most of them are slow growers, but do not easily break, are seldom troubled with insects, and offer a symmetrical and pleasant aspect. For wide avenues, where there is plenty of room, preference is shown for the Sycamore—a favorite shade tree in Europe, though not so popular here—and the Linden and Elm." †

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*The seven different species of Maple used for street-planting in Washington are:

Common Name.	*Botanical Name.*
Box Elder,	Acer negundo.
Sugar Maple,	Acer saccharinum.
Sycamore Maple,	Acer pseudo-platanus.
Soft or White Maple,	Acer dasycarpum.
Black Maple,	Acer nigrum.
Red Maple,	Acer rubrum.

A. L.

†The following, with the seven species of Maple, completes the list of the street trees of Washington:

Common Name.	*Botanical Name.*
American Linden,	Tilia Americana.
European Linden,	Tilia Europaea.
Sycamore or Bottomwood,	Platanus occidentalis.
Sycamore (European Plain tree),	Platanus orientalis.
American Ash,	Fraxinus Americana.
American Elm,	Ulmus Americana.
Winged Elm (Whahoo),	Ulmus alata.
Slippery Elm,	Ulmus fulva.
Corky White Elm,	Ulmus racemosa.
Carolina Poplar,	Populus monilifera.
Lombardy Poplar,	Populus dilatata.
Grecian Poplar,	Populus Graccea.
Turkistan Poplar,	Populus simonivensis.
Catalpa,	Catalpa bignonioides,
Japan Catalpa,	Catalpa Kempferii.
Laurel-leaved Willow,	Salix.
Sweet Gum,	Liquidambar styraciflua.
Maiden's-hair tree,	Salisburia adiantifolia.
Cypress,	Taxodium distichum.
Weeping Cypress,	Taxodium sinosistis.
Pin Oak,	Quercus palustris.
Willow Oak,	Quercus phellos.
Swamp White Oak,	Quercus bicolor.
White Oak,	Quercus alba.
Tulip tree,	Liriodendron tulipifera.

A. L.

COPPICE AND TIMBER GROWTH.*

By B. E. Fernow,
Chief of the Forestry Division, Department of Agriculture, Washington, D. C.

Maturity, *i. e.*, the time when trees will bear seed often and plentifully, with slow growers generally, sets in when they have attained their maximum height accretion; quick growers mature earlier: Shallow soil, warm exposures, or increased influences of sunlight accelerate maturity, whilst the richer soils, northern aspects and denser growths retard the maturing. For every species and locality, the time and periodicity of seed years must be determined from experience.

The rule of careful forestry requires us, above all things, to keep the soil under cover, to expose it to the drying influence of the sun and wind as little as possible. This rule is violated oftener in the coppice system than in the timber forests with long rotation. * * * * *

Mass accretion in a forest not only shows a different rate at different ages, but *ceteris paribus* shows a difference of rate according to the origin of the trees; the maximum of yearly average *mass* accretion of a well-stocked forest occurs before the time of maturity, and is directly proportionate to the height accretion, so that the masses of two tracts of similar character are nearly proportionate to their heights. From this experience alone, it may be deduced that the rate of mass accretion differs considerably in coppice and timber forest. In the former, the greatest annual *height* accretion is observable in the first year, especially from old stocks, but ceases soon. The average annual *mass* accretion may, therefore, reach its maximum a few years after the new growth is started; yet for other reasons affecting the utility of the crop, the longer rotation of twenty to thirty years is preferable when the yearly average mass accretion just begins to decline.

In seedlings, the *height* accretion of the first year is inconsiderable, and increases in rate from year to year; it reaches its maxim some time before maturity, when it remains stationary for awhile, then gradually sinking towards maturity. Consequently, on that part of the timber which will remain to the end of the rotation, the maximum yearly average *mass* accretion is attained near the time of maturity, when it remains stationary for some time only; with light-needing species and especially on poor sandy soils it sinks rapidly. In this system of management, a considerable part of the original growth may be utilized by thinning interlucations, and should not be forgotten in the estimates of the amount of wood produced. Unfortunately for the calculation, the amount so available can hardly be determined beforehand, because it depends not only on the greater or less original density of the growth, but also on the amount of nurse-trees held over from a former rotation; on the quantity of soft woods, birch, poplar, willow, etc., which have to be removed; on an earlier or later beginning and frequency of interlucations, which last considerations essentially influence not only the amount of material utilized in the interlucations, but, also, determine the slower or quicker development of the principal growth. Doubtless, the greatest mass of this material from thinning may be expected during the period of greatest *height* accretion, and poor soils, which are not able to sustain and develop as many specimens per acre to the end of the rotation, will yield a larger amount of this material in proportion to the main crop.

* From Forest Leaves for September, 1886.

We are cutting, burning, and wasting from thirty to forty billion feet yearly now, and will shortly cut much more, not only in proportion to the increase of our own population and settlements, but also in accelerated proportion, as the export European forest resources declines, and the *vastness* will disappear at no distant day, and before a full-sized timber forest can be grown.

There will not be a timber famine; the law of supply and demand, and the forests of countries as yet undeveloped will take care of that; but a scarcity, high prices, and injurious influences on all industries using wood cannot but be felt soon.

The same acres will not cut the same amount, robbed, as it were, of their natural facilities of reproduction by human interference, without equivalent after care bestowed upon them.

Do not think this warning untimely, judging from the past. The world is developing at an accelerated ratio, the competition and the demands on all the industries require more and more close application of scientific principles, economy, and husbandry; the slipshod ways of the good old times are growing more and more unprofitable.

TRANSPLANTING OF TREES FROM WOODS.

'No more arbor-days for me," said a man, meeting an acquaintance in the city. Upon inquiry as to what induced him to form such a rash resolution, it was ascertained that on Arbor-Day, 1883, he had set out a line of trees along the roadside bordering his farm. "Are you sure," his friend asked, "that the trees were alive when you planted them?" "Sure? Yes, iLdeed, for in the morning I took them out from the woods and planted them in the afternoon of the same day."

As the soil was congenial, and the trees were planted with proper care, and then protected against external injury, the cause of failure must have been in the taking up of the trees. Failures of this kind, which are by no means uncommon, are very serious, for the planter loses not only the trees, and the labor, but frequently also all further interest in forest-tree planting, and it is, therefore, necessary to guard as much as possible against a re-occurrence of the same. For the information of those inexperienced in the details of taking up trees from the woods and of transplanting them, we quote from the American Agriculturist of October, 1883:

"Many think it cheaper and better to take up large trees from the woods, and transplant them to their ground or to the roadside, than to buy nursery trees. As a rule, such trees die; they fail because proper precautions have not been taken. In digging up the tree all the roots outside of a circle of a few feet in diameter are cut off, and the tree is reset with its full head of branches. Whoever has seen trees in the forest that were upturned by a tornado, must have been struck by the man-

ner in which the roots run very near to the surface, and to a great distance. When the roots of these trees are cut off at two or three feet from the trunk, few or no fibrous or feeding roots are left; and if the mass of tops are left, the expansion of the buds in the spring will not be responded to by a supply of sap from the roots, and death must follow. If such trees have the tops completely removed, leaving only a bare, they will usually grow when transplanted. The tree is little more than an immense cutting; but there are roots enough left to meet the demand of the few shoots that start from the top, and growth above and below ground are well balanced. We have seen maples, elms, and bass-wood trees, fifteen feet or more high, transplanted in this manner, without a failure. Some trees treated in this manner were planted in our neighborhood about ten years ago. They have now as fine heads as one would wish, and show no signs of former rough treatment. Trees in pastures, or on the edge of the woods, are better furnished with roots. These should be prepared for transplanting by digging down to the roots, and cutting off all that extend beyond the desired distance. This will cause the formation of fibrous roots near the tree. It will be safer to take two years for the operation, cutting half of the roots each year. Such trees may be removed in safety, especially if a good share of the top is removed at transplanting.

"Shrubs of various kinds require the same treatment. Many of our native shrubs are of great beauty, and desirable as ornaments to the grounds. As ordinarily transplanted, they are rarely satisfactory. If the whole top of these shrubs, every branch, be removed, leaving only a stick with as much root as can be secured, success is quite certain. We have removed the Laurel (*Kalmia latifolia*) safely in this manner; the shrubs show no signs of their rough treatment."

CHESTNUT CULTURE.

By Sam. C. Moon,
Of Norrisville, Pa.*

Varieties and Characteristics.

The botanical name of the Chestnut is *Castanea vesca*, L., named after the territory of Castanea, in Thessaly. Loudon, in his Encyclopedia of Plants, says, that "The American chestnut differs so little from the European, that no specific distinction can be drawn." There are, however, several marked characteristic differences between the indigenous trees of the two continents. The most striking one is the difference in habit of growth. The habit or the American variety in young trees is to grow tall and erect, while the habit of the European is to form a lower, rounded head, very much in the style of the Norway maple, the height of the tree and the spread of the branches being about equal. But the

*This excellent paper was read at a meeting of the American Institute Farmers' Club and published in the *Tribune and Farmer*. There is great need of such practical information as is given in this paper. It will be especially interesting to those who have planted Chestnut groves or orchards, as well as to those who contemplate planting such.—A. L.

strongest evidence of a distinction is found when we attempt to intermingle their food by grafting. Scions will unite more easily and perfectly on stocks of their own family.

The leaves of the American variety are a little more acute and thinner in texture, while there is a slight difference in the appearance of the foliage and young growth, which a practiced eye can detect at a glance, although it is difficult to describe it so that an inexperienced person could comprehend the distinction. The nuts of the American variety usually have more of the downy covering on the upper part of the shell. The inner skin which covers the kernel is generally, in the European variety, more or less bitter, if eaten raw; but this bitterness is removed by boiling or roasting, although it is very seldom, if ever, that nuts of this variety are found as sweet or as finely flavored as the native nuts. The nuts of the European variety usually ripen from one to two weeks earlier; it is not uncommon for some trees to ripen and drop their whole crop before the appearance of hoar-frost. The nuts of the foreign variety are larger than the native, but it is very erroneous to suppose that the majority of the chestnuts which grow in Europe are as large as those which are imported into this country, and which are seen exposed for sale on the fruit-stands. Those are selected nuts, and are considered exceptionally fine, even in their native land.

The southern peninsulas of Europe, Italy, Spain and France appear to be the most congenial home for the chestnut, and there the nuts are more general than in most other parts of the world; but the fact remains that a tree which came from either of those countries, or was raised from seed imported from there, affords no certainty that it will bear large or good nuts. Very many of the European trees are but little, if any, larger than our own. All trees which are raised from seed vary more or less from their parent, and from each other. Certain peculiarly favorable conditions of soil or climate, or other influence, may operate to establish certain characteristics in a race of plants as well as of man. Some persons appear to entertain an idea that such a development has taken place in the European trees, and that the English, French, Spanish and Italian chestnuts are distinct varieties; and there are advocates who claim for each superiority over all others. But I am not able to learn that there are any characteristics peculiar to the chestnut trees of either country sufficiently distinct and well established to justify denominating them as "national" varieties, any more than we should speak of the New York, Pennsylvania and Virginia chestnuts as being different kinds. It is for this reason that I prefer the term "European" chestnut, as distinct from the American.

The "Marron de Lyons," and other superior varieties which are

highly recommended by the European nurserymen, will not endure our climate. But very few of the chestnut trees which are imported from Europe, or are grown here from imported seed, are hardy in this latitude. They are almost invariably injured or killed by the cold winters. There are, however, exceptional trees, more hardy than others, which endure our severest winters, and stocks raised from the seed of such trees are also hardy. In this manner a robust strain of stock has been accumulated here, and it is probable that there are a few hardy trees in this country which bear as large and as good nuts, and as abundantly, as any to be found in Europe. But natural chestnut-trees vary in the essential qualities which render them valuable, viz., productiveness, size and quality of fruit, time of ripening, etc., just as other plants do which are raised from seed. Therefore, grafting is as necessary in the chestnut as in other kinds of fruits, if we wish to insure with a certainty these valuable qualities to young trees.

Within the past few years I have had opportunity of observing more than thirty seedling European chestnut trees come into bearing, and of that number, only six proved to be really valuable. The others were nearly all cut down, because of their unproductiveness. The burs of some trees would not open when their crops was ripe, but fell with the nuts fast in them; perhaps as unmarketable a crop as could be raised. Of these six trees, which are now in their prime of bearing, only one combines all the essential points of excellence in the highest degree. This tree is now about thirty-three years old, is perfectly hardy, and has been enormously productive for several years. It is about forty feet high, and its branches cover an area of forty-two feet in diameter. The nuts are of the largest size. Sixty extra specimens have been selected which would measure one quart, while a quart of the average sized nuts numbers about seventy. The largest crop which it ever bore was in the autumn of 1880, when it produced eighty quarts. The average product for the last four years has been about two bushels per year. If this tree has any fault, it is the tendency to overbear. It blossoms twice nearly every year, and usually has a second crop of half-grown green burs on it at the approach of cold weather.

Age of Bearing.

The age at which natural trees commence to bear fruit is usually from fifteen to twenty years, but when grafted with a productive variety the age for fruition is reduced to eight or ten years. Grafted Chestnut trees will come into profitable bearing about as early as apples. Trees which were worked when one or two years old, will probably bear their first fruit the fifth or sixth year after, and it will be five or six years

more before the crops of fruit will be sufficient to more than repay the expense of gathering and marketing.

Cultivation.

The cultivation of Chestnut trees requires careful handling in every stage of their management, from the gathering of the seed until the grafted trees are planted out in the orchard. They are very sensitive to exposure of their roots to the air, and a very little neglect or carelessness in this particular will kill them, but if proper precaution is used they are of easy culture. To raise trees from seed, gather the nuts as soon as they fall and spread them on the floor in an airy room for two or three days, to allow the excessive moisture to sweat out; but they must not be exposed enough to become dried or shriveled. Then put them away for the winter in a box with alternate layers of moist sand, or saw-dust or moss, spreading the nuts very thinly, so that no two of them will touch each other. They should be kept in a cool, moist cellar, secure from mice, until spring. If kept too warm they will sprout before planting time, and the sprouts will be broken in handling them. As soon as the weather will permit in spring plant the seed in rich soil, covering with mellow loam, about one and a half inches deep.

Some persons prefer to spread the nuts on the ground when they are gathered in the autumn where they wish them to grow, and then protect them from the frost with leaves; then, in the spring, remove a portion of the covering, leaving only as much as the sprouts will be able to push through. This is certainly nature's method of preserving them, and if it were not for marauders would, perhaps, be the preferable one, but it is almost impossible to secure them in this manner from the ravages of mice and squirrels. Ground-mice will even eat the roots of one-year old trees, and if measures are not taken to prevent it may destroy a whole crop of plants the first winter. To guard against this it is well to dig the small trees and trench them in a secure place the fir t autumn.

Transplanting.

Chestnuts should be transplanted either the first or second year, as it is important to get the long roots checked and a mass of fibres formed while the trees are small, which is accomplished by occasional transplanting; otherwise there will be a great loss, if they have to be moved after they are grown up. To get well-rooted stocks, which have been transplanted once or twice while quite small, is one of the chief secrets of success in all planting, and the moving of large trees which have not

been so treated is always attended with serious loss of life, or possibly they may linger along in a stunted condition for years before they recover the check given them. Where this precaution is neglected the chestnut will be found one of the most difficult trees to handle.

Time and Mode of Grafting.

The best time for grafting chestnuts is the second or third year after transplanting. They are more difficult to graft than some other trees, and young stocks will work more readily than old ones. The scions must be cut very early in the spring, before the buds commence to swell, and kept in damp earth or moss, or saw-dust, in a cool place, until the buds on the stocks are about bursting; then work the young wood by tongue grafting, and wax very effectually. The grafted trees will require attention during the first summer to keep the natural suckers gradually reduced, and the sap encouraged into the scion as it acquires strength. It requires longer time for the perfection of the union between stock and scion in the chestnut than it does in many other trees; grafts will often start and grow vigorously for a few weeks, but after they have grown six inches or more will die from "drowning," by too much sap, or from "starvation," by being robbed by the natural suckers. It requires judicious and skillful management to coax the grafts along through their first summer. The European chestnut succeeds best when grafted on stocks of its own family, although it can be worked successfully on the American variety, but on this many of the scions unite imperfectly, leaving an unsightly swelling at the point of union, where the tree is liable to be broken off.

Planting and Location.

In planting chestnut orchards the trees should stand about forty feet apart each way. They will flourish in a variety of soils, but want good, rich ground. Their natural home is on the strong and rocky hillsides where the land is good. They do not flourish on alluvial bottom lands as well as on higher situations. There are vast areas of territory in many rugged districts which could be utilized to good advantage by the introduction of chestnut forests. I do not know of any more desirable or more profitable tree to plant in meadows or pasture lands, to afford shade for cattle, than the improved varieties of chestnut, and it has few superiors as a shade tree in many other situations.

THE AMERICAN CHESTNUT.*

There is no tree that so quickly and surely reproduces itself from the stump, by sprouting, as the sweet chestnut. (Castanea vesca).† When a tree is cut in winter or early spring, a thicket of sprouts come out around the stump, and in a few years' time replace in weight and bulk the original tree.

There is near me a piece of second-growth timber, the original timber of which was removed in the winter of 1863–64, and which has been allowed to sprout and grow unmolested until this time. The most thrifty and beautiful of all this growth is the chestnut. Around one stump, which now measures twenty inches across the top, two feet from the ground, are nine sprouts, the smallest of which is about ten inches around, and the largest thirty, one foot above the stump. Six of the remaining are over twenty inches in circumference at the same height. The tallest is about seventy feet in height. Whether the original tree was straight, and tall, and valuable, I have no means of knowing, but the present combined size of the sprouts at the stump is about equal to the stump itself. The original tree was probably not less than one hundred years old, while the sprouts are but nineteen. This tree stood in a thicket of other varieties, under quite unfavorable circumstances. Had the sprouts all been removed but two, the second year after the tree was cut, these two sprouts would have been large and valuable trees at this time. Probably at first thirty or forty sprouts made a start, and doubtless ten years were wasted in a struggle for existence among these numerous sprouts, which finally resulted in permitting nine to grow.

In the edge of my own wood-lot are several chestnuts from eighteen to twenty-two inches in diameter, which have grown from trees which were cut in the autumn of 1854. In several cases the sprouts are larger than the original trees. Only one sprout was allowed to grow from a stump.

In the iron regions of northwestern Connecticut, it is the practice to cut over the steep hillside forests, which are mostly chestnut, once in twenty-one years, making the wood into charcoal. This has been done for more than one hundred years, yet the yield is each time larger than before.

A neighbor of mine has recently cut about fifty thrifty chestnuts to make rails for repairing his fences. If he would carefully protect the sprouting stumps for three or four years, he would, in twenty years' time,

* From Farm and Fireside, March 15, 1883. (Contributed by Lawrence, Summit county, Ohio).

† Castanea vesca, Gaertner, var. Americana, Michaux. A. L.

have a growth of timber which would again repair his fences. As the chestnut-trees he has cut are scattered in a forest which he does not expect to remove, the cost would be absolutely nothing; instead of this he allows a herd of cows to range in this woods, destroying everything that starts, and getting very little of value in the way of pasture. The shortsightedness of his course is more marked from the fact that he has an only boy whom he hopes to have succeed him in the ownership of the farm.

Wherever a chestnut tree is cut in a lot devoted to timber, one or more sprouts should be protected and encouraged to utilize the already extensive root formation which is ready and more than willing to carry on the good work of growing timber.

FOREST CULTIVATION FOR PROFIT.

By Hon. Martin Conrad,
Of Chicago, Illinois.*

Mr. President, Ladies and Gentlemen: I have accepted with much pleasure the invitation to address you on that department of forestry which more particularly concerns the present and future supply of timber required for the manufacture of farm machinery and wagons, because I feel that timber culture is not ordinarily a subject of such popular attention as it deserves to be.

The few remarks I am about to make, may suggest further channels of research and experiments in this noblest of nature's domains, and it is for you, as the practical promoters of this branch of our great agricultural interests, to direct such efforts as may be awakened by my words, if you shall judge them worthy of such distinction.

It is a noteworthy result of our daily vocation, be it what it may, that we are always taking mental notes of whatever may have the remotest connection with it; yet it is true that this unconscious mental action in time quite dominates our facilities of observation. We hear the stockman speak only of the cattle he has seen in his travels—and it is the dairyman who can locate every fine herd of "good milkers" in the country. Even Miss Flora McFlimsy, absorbed in her own delightful occupation, may have "clean forgot" the text and all the good pastor said—but she can minutely describe each "duck of a bonnet" that comes within her range of vision. So it comes that the lumberman is no

*This well prepared paper was presented at the meeting of the American Forestry Congress, held at Springfield, Ill., September 14, 1887.

exception to this universal rule, for, even while gazing on your favorite herd of short-horns, his mind is elsewhere. He sees only the leafy grove in whose shade they are gathered, and is undoubtedly figuring how many feet of this or that grade each spreading oak would average.

Influenced in much the same way, my own observations during twenty years of experience in the wagon business have included in their scope the great problem which to-day confronts its chief ally, the lumber interest. I need hardly say that I have noted with much solicitude the wholesale destruction of our forests in all parts of the United States. I use the word "destruction" advisedly, and in its fullest sense; because the removal of timber for actual use is but a fraction of the evil causes now at work upon our wood-lands—while wantonness and rapacity are doing their worst in this war of extermination. Even the farmer, eager for quick returns, relentlessly uproots the last sapling, that the ground may be sown with grain, not thinking of how he is robbing future generations of their just heritage.

In ever widening circles does this destruction spread over the land. It is but a few years ago that Chicago drew the bulk of its white-wood supply from the State of Michigan, while to-day, that great timber State, in common with ourselves, draws upon Tennessee and other southern districts for this valuable wood. Oak, at that time, was so abundant that it could not be profitably shipped by rail to Chicago from outside a radius of a hundred miles; whereas, to-day, Arkansas and Mississippi are represented in the oak supply of the Chicago yards. Black walnut and live-oak are already practically extinct—but long before the culmination of this ominous result, even as far back as 1868—the Hon. T. M. Edmunds, in his report to the United States Department of Agriculture, foresaw a complete extinction of all timber resources of the United States in about fifty years. This threatened loss alone should demand prompt measures of restraint; but the disasters that we invite, through the climatic changes that must follow our imprudence, are appalling enough to justify the gravest fears.

It is not my purpose to introduce here any lurid pictures of calamities in store for us—as better pens than mine, guided by the hands of science have already enlightened us as to the probable course of events if the present conditions are allowed to continue. The note of alarm has been sounded long ago, and the stormy floods of the Mississippi and the Ohio have re-echoed it with terrific emphasis.

In proof of the enormous climatic changes that can result from such a cause, I may mention that we have an actual demonstration of the whole process at our very doors. I refer to the northern domain of our sister republic of Mexico, a section whose former luxuriance of vegeta-

tion once proclaimed it a paradise, and whose mineral wealth marked a brilliant page in the chronicles of the sixteenth century. This region is to-day a parched and torrid desert land, treeless and waterless, in whose barren solitudes it would seem that few would have dared to venture.

Yet it is a deeply significant fact that these sun-burnt valleys, not only around the city of Chihuahua, but also in many other parts of that section, should be covered with acre after acre of slag from silver-ore. It must be borne in mind that in all this strange region, there is not a bed of coal, and that, therefore, the extensive smelting operations that are evidenced by the vast field of slag must have required an also convenient supply of wood for fuel. It follows, then, that at some distant period of the past, dense forests must have covered this land, and furnished the necessary fuel, thereby completely verifying the statement of Bernal Diaz, the soldier historian of the Cortez expedition, that they found the region covered with luxuriant woods, verdant valleys and fertile plateaus. It was the treasure hunters, then, who followed these conquerors, that inaugurated the destruction which has extinguished these forests, and swept all vegetation from the land.

With nature's sheltering mantle thus removed, the denuded earth quickly yielded to the influence of an already arid climate, and the desert promptly spread over the area thus prepared for it. The noble forests have vanished at the touch of civilization, and with them, also, the life-giving interchange of clouds and the dew—the balance-wheel of nature's fertility. To-day only a few scattered ruins, here and there, in the midst of lonely wastes of desert, are left to speak of their former beauty and grandeur. Could the explorer Cortez, and his devout historian, at this moment look upon those beautiful valleys of three hundred and fifty years ago, viewing again the scenes of their adventures and discoveries, their pious Catholicism might be charmed by the sight of the grand cathedral, with its stately towers, costing almost a round million of dollars, as well as the beautiful park at its doors, with its fountains, trees, and luxuriance of tropical plants, maintained in this splendor by the ever watchful, artificial care of man; but, looking beyond this little garden spot, they would search in vain for the Eden of primeval beauty that first met their wondering gaze, for their eyes would rest only upon the dreary desolation and ruin which their treasure-seeking followers left behind them.

I do not attempt to trace the exact degree of climatic changes wrought in this particular instance. It is sufficient that the connection from cause to effect is obvious; and to those who have given a thought to the science of forestry, I need not repeat the immeasurable

benefits conferred by the presence of forests; how they equalize the humidity, how they furnish shelter, create springs, control the flow of rivers, and protect the proper moisture of the ground. On the other hand, history supplies instances enough of the decay of nations whose decline may be logically traced to the imprudent destruction of their forests, and the consequent disastrous and deteriorating changes of their climate.

Fortunately we have a prudent example before us in the countries of Europe, in all of which the forests are under government guardianship, protecting them against fire as well as spoilation; and, however little we may profit by this (for such a system would be a physical impossibility in this country), it may, at least, serve to remind us that our national legislation tends to the opposite direction, and that at least indirect relief could be afforded by admitting foreign lumber free, and thereby lessening that much of the drain upon our own resources.

Without stopping to discuss this point, it is worth while to see what can be done legitimately in the right direction, and to inquire if there is not a chance of redeeming the situation by intelligent and well-directed individual action, with a sufficient incentive of personal profit to warrant hopes of success. If I can show that proper efforts in tree culture will prove profitable, and that it is a sure and valuable investment for any farmer and landowner, this may be the means of forestalling evil results and recovering some parts of what has been so wantonly destroyed. To investigate this interesting point, I have searched many records, and exhausted many tables of statistics, only to be met with a most surprising meagerness of practical information on the general subject. It seems that of late comparatively little personal knowledge of any value has been given to the world, and if there be any reason for this it will lie in the fact that the life of a natured tree far exceeds that of a man, and that consequently no one individual can possibly follow the complete growth from its germination to its natural end. All our knowledge of any given growth is, therefore, a series of tradition, so to say, for each authority can furnish but a small section of personal experience.

In my researches I have consulted a great variety of authors as well as the very latest government reports bearing on this special subject; but, as already intimated, the practical side of the information they afforded was singularly meager and unsatisfactory. One author devotes a valuable number of pages to a continuous rhapsody over the "great ash tree" under which he played in the days of his childhood, while a still more pretentious writer, in trying to cover his exhaustive subject—"Trees of America"—commits the unpardonable blunder of

entirely omitting all mention of the oak—that tree, which above all, from a utilitarian stand-point, has earned the right to be called the king of our forests.

It followed, therefore, as a result of my researches, that I was compelled to fall back, in a great measure, upon my early experience with the trees of the forest, together with the practical knowledge of my later years in handling lumber as a manufacturer. Before I present the tabulated results of our calculations, I will give a short description of the five kinds of wood used in the construction of farm wagons, for in these five we have all the varieties that are used in implements and all outdoor machinery. I begin with the oak. (Quercus). Of the 150 or more varieties of this tree 82 are native to this country. Of these the White Oak (Q. alba) is the only one in demand by wagon and carriage builders, and as it is at the same time the most serviceable for all mechanical purposes, I will describe only this species.

The White Oak is indigenous to the State of Illinois, and is mostly found on yellow loam of moderate fertility, although it also flourishes on our prairie soil. It matures at about an average age of 80 years, after which it gains in size, but with no further improvement in quality, its further growth being a mere accumulation of adipose, if I may use such a comparison. When fully developed the White Oak is one of the largest and grandest of the entire forest tribe, and it is, of all the deciduous trees, about the most valuable for general purposes. In a wagon it furnishes the hubs, spokes, felloes, and all the running-gear, except the axles and the tongue, and it takes the lead in all other branches of wood manufactures, where special strength, solidity and durability are required, as in ships, car building, cabinet ware, implements, etc., etc. The natural forests of this supremely useful tree are, however, rapidly disappearing, and, if only on the ground of utility, its preservation and culture should be our very first care.

Next in order comes the hickory (carya). The hickory is exclusively an American tree, of many varieties, one or more of the several species being quite common in every State of the Union. None of them, however, better merits cultivation than the Shellbark, for wherever special elasticity is required, as in wagon axles, carriage spokes, hammer, pick and tool handles, etc., it stands without an equal, and in its growth it is as rapid as any of its kind. The timber is heavy, hard and elastic, and is very durable, except when exposed to a foul or moist atmosphere, in which case it decays rapidly. It grows to a height of sixty or eighty feet, with a diameter of two feet, and while young it is exceedingly graceful and ornamental, so that it might well be cultivated

for its beauty alone. For fuel its wood is by far the best in America, and its fruit is the hickory-nut of commerce.

The "thick Shellbark" must not be confused with the species just described. To identify the proper nut for planting, I may mention that it is of a globular shape, somewhat flattened, nearly pointless, with a thin shell and a large kernel. The nut of the "thick Shellbark" is twice as large, and has a sharp point at each end, the shell is thick, hard and of a yellowish tinge, while the kernel is very inferior. The leaf of the "Shellbark" always consists of five, while the "thick Shellbark" leaf has seven or nine. In this way the difference can be easily distinguished, not only in the seed, but in the young trees as well. Hickory for timber should be grown uninterruptedly from the seed; but it has been asserted that the transplanted tree will bear more and better quality of fruit.

I will now pass to the well known ash (*fraxinus*). To the manufacturer of wagons and agricultural implements this valuable timber is of high importance. It is very durable, and unites lightness, strength and elasticity to such a degree that no other wood could properly replace it for wagon tongues, fork handles, and the like.

It exhibits also a highly ornamental finish when used in floors, furniture, wainscoting, and interior trimming of dwellings generally. Besides all this, it is of high rank simply as fuel, and for all these multifarious purposes its consumption has so largely increased that the better grades are becoming very scarce, and the price has advanced at least 25 per cent. in the last fifteen years. I venture to say that unless its cultivation is begun very soon, the present generation will see its last for practical uses in this country.

Indigenous to North America are the *White Ash*, as also the *black*, *blue* and *green*, but of these the *White Ash* is the most valuable. It bears transplanting even when quite well grown, and appears to be quite free from insect foes, so that its cultivation would have at least these important points in its favor.

The next in order is the "tulip tree" (*Liriodendron tulipifera*), which belongs to the family of the Magnolia, and although commonly known under the various names of "White wood," "Yellow Poplar," "Tulip Poplar," etc., it does not resemble the true poplar in any respect. There is but one species of this genus, and it is one of the largest and finest trees of the American forests. Hough, in his "Elements of Forestry," speaks of specimens attaining a diameter of *ten* feet, and a height of 150 feet. It is found more or less all over the United States, but chiefly in the Western forests, wherever the climate is not too severe, and where the soil is deep and fertile. Its lumber, known as

"White wood," is superior to pine in wagon and carriage building, for several reasons. It is stronger, less liable to twist and warp, and has a dense grain, which renders it capable of taking a very higher finish without the use of any previous "filler," for which reason also its finish is much more permanent. Its clear qualities also enable its use in wide boards and the largest class of timbers. Its quality of width being a leading attraction, it requires at least sixty years before it attains a marketable size, hence, its only value to the producer in the meantime is its ornamental appearance, in which it has few equals. Its leaves are large, bright and glossy, its blossoms are of good size, abundant, and of an agreeable odor. This tree should be cultivated from the seed and deserves an extensive propagation, for it would be hard indeed to find another kind to fill its place in the wood-working industries, especially wagon-making and furniture. Its color and quality is decidedly affected by the nature of the soil on which it grows, and leads to the various names of "white," "blue" and "yellow" poplar, by which it is erroneously designated. The difference, however, is not externally manifest in the tree. The "yellow" variety is the toughest, hardest and most flexible, which leads to its extensive use in carriage panels, cylinder desks and other work where flexibility and toughness are required.

My list of wagon woods will end with the *pine* (*pinus*). This is the only coniferous tree that is of use to the wagon-maker, and it is perhaps fortunate, because none of the conifers are of any value for wagon lumber until at least sixty years of age, being used exclusively in the form of boards. To make the best lumber, they should be thickly grown when young, in order to produce a straight, tall tree of nearly uniform diameter, and free from roots. If grown in isolated situations, the tree will expend its vigor in the production of useless side-branches, and the trunk will taper very rapidly from the base.

The pine is used for wagon-box bottoms, in which the "hard-yellow" variety is chiefly employed. Its chief recommendation is its cheapness, since ash is fully its equal in lightness and superior in durability. The fact is, if it were possible to dispense with pine entirely, the wagon would be the gainer, and the list of our wagon woods would be reduced to the four deciduous trees already described.

Here, then, we have five species of forest-trees whose extinction alone, or even decline, would be a calamity of measureless extent to our entire nation. But it is a most unfortunate characteristic of our people, that, however imminent the danger, the great mass of them—in fact all but a few specialists—fail to evince the slightest personal interest in the matter. In a spasmodic manner, and to a limited extent, the tim-

ber question has received the attention of local, state, and national legislation, but to the average farmer the impending result carries but a very indistinct impression of a vaguely distant future days—interesting him much the same as the paragraph in his almanac, which tells him of the ages that remain before the extinction of the sun. To him it is a matter that concerns future generations, but need not worry; provided he credits the statement at all, which is not always. Moreover, with the great mass of people, the maxim holds good that "what is everybody's business is nobody's business," and however threatening the result—when it comes to "sowing what others may reap." or making sacrifices from which no return may be hoped for in this life, it is asking a good deal of human nature.

To bring forth adequate results, therefore, will, as I have said, require the powerful stimulus of personal gain to whomsoever shall venture his means and his time in this beneficient work. I am aware that it is the unfortunate, though general impression, that no profit can possibly accrue to an investment that waits for a forest to grow up from the seed, yet I propose to show that nothing could be further from the reality. I maintain that there is a profit in it, and that a well directed system of cultivation will not only repay the investment richly at an early period, but will be the means of solving the economic problem of our timber supply.

Any line of inquiry looking to the practical solution of this great problem must naturally begin with the number of trees that can be successfully grown on a given space of ground—say an acre—for a unit of calculation; but simple as the question may seem, it is vain to look for it in books. One German authority gives us 300 to 400 trees to an acre, as the results of an eighty-year period of cultivation; but unless we are ready to allow a good deal for the rigorous thoroughness of the forestry system of the old country, we may be pardoned for doubting these figures. We must reflect that a square rod to each matured tree is a small enough allowance of ground space for a large healthy growth. This gives us 160 trees to an acre, but to be still more conservative, let us knock off 50 more, leaving 110 trees for the harvest eighty years after planting the seed. This result coincides exactly with the figures given by A. R. Whitney, Esq., the veteran tree-grower and proprietor of the well-known Whitney nurseries at Franklin Grove, Ill.

The long, practical experience of this gentleman has formulated the following method of cultivation, viz.:

Starting with a planting of 2,720 young trees to the acre, set four feet apart, he begins by trimming out, after ten years of growth, every other north and south row. Five years later every alternate tree in

each of the remaining row is removed, and after another interval of five years more, cull out all imperfect growths, which will leave an average of not less than 110 trees to the acre.

To put this result in marketable form is the next step in our inquiry, that we may determine the money value of our harvest. Our leading hard-wood lumbermen count an average of two trees for each 1,000 feet of lumber, and with these factors we may easily compile the following table, showing the balance per acre of our eighty-year crop of cultivated trees:

VALUE OF AN ACRE OF TIMBER OF EIGHTY YEARS' GROWTH.

Number of trees per acre	110
Number of trees to cut 1,000 feet	2
Number of feet of lumber per acre	55,000
Price per 1,000 feet	$18 00
Value per acre, eighty years' growth	$1,100 00
Average value per acre per year	$12 37½

Is not this encouraging result worthy of earnest consideration by every farmer and land-owner? A little further reflection will show him that the above result is safely within the reality, as such lumber we speak of will be worth at least $50 per 1,000 eighty years hence, and he may also count upon the yearly trimmings of trees, which increase in value, growing from poles to trees that will make the very best second-growth spokes and carriage stock, as well as all kinds of the most expensive ax, hammer and pick handles. For these purposes, a tree at thirty to forty years is of greater value than when fully matured. Besides this we will have timber which will be useful for fuel, fencing or charcoal, and will eventually afford a steady revenue far beyond the actual cost of supervision and labor, and in addition to all this we must bear in mind that the timber left over after the logs are cut, including the tanbark, is nearly as valuable as the logs themselves. But you may say that a period of eighty years—aye, forty years—is a long time to await the fruits of your labor. True; but cannot its full value be realized just as readily as any of the other permanent improvements on your lands? Your investment in the tree-plantation is not locked up, for should you sell the place at any time, it will certainly take rank with the rest of the improvements as an element of value, and will bring its full price.

No other improvement on your estate can do more than this. The soil itself is certainly not as productive as it was when you first turned the virgin sod, while neither the well-appointed farm-house nor the roomy barn nor any of the other fixtures can even realize you a cent

except as part and parcel of the whole, and then only when it passes out of your possession by outright sale. It is the sum of all these improvements that enables you to value the property at twenty times its original cost, and not because the land will produce more than it did in the past.

Your investment in the tree plantation must, therefore, be ranked with the permanent improvements of the place, with the additional certainty that, at whatever period of its growth a transfer of ownership may take place, it will invariably yield its full value, for while all the rest are undergoing the process of natural decay, and requires constant labor and expense to keep them in repair, the value of the tree-farm until it matures is steadily accumulating with the years, and it must, therefore, in its intrinsic worth, prove the most valuable of all the improvements on your estate.

My subject having been limited to only such woods of natural forest growth as are in present use for the purpose referred to, I must mention that there are numerous varieties maturing at least a decade earlier that are possibly better adapted to our prairie soil, which might be substituted in many branches of manufacture without affecting the quality of the article. However, as I have based my estimate of profit upon the oak, which of all species requires the longest time to attain maturity, it follows without argument that with trees of an earlier maturity the average would be proportionally larger.

Having therefore clearly shown that the culture of timber implies nothing in the nature of sacrifice, but on the contrary is a valuable source of revenue, it follows that the great problem can be solved by the incentives which nature herself holds out. She asks nothing without recompense, but offers a far more substantial reward than the mere consciousness of duty performed. Had the proprietors of the Schluttler wagon-factory planted an oak for each one they cut down for spoke timber since the establishment of their works in 1843, they might today make a like amount of second growth spokes from the same ground.

And before going further, let me say that this latter fact has actually been verified in a most interesting and noteworthy manner. The factory named has just finished a wagon built entirely of cultivated Illinois timber, twenty varieties of which enter into its construction, none of them over forty years' growth from the seed. This great variety was sought, only to show what is possible to produce on our prairie soil, and not for lack of material, for the entire running-gear could have been made out of one honey-locust log in the lot, which measured 18 inches clear in diameter. The entire assortment of woods was furnished by Mr. A. R. Whitney, of Franklin Grove, of whom

mention has been made, and his testimony on this subject hardly needs stronger proof than this interesting collection of Illinois woods, grown by his own hands. No less praise is due to the far-sighted manufacturers, whose thorough grasp of the question has thus evolved the first wagon of the kind ever seen on the American continent.

To conclude my theme, I would therefore offer the plan of "Tree Culture for Profit" as the only rational means that we have, not merely for recovering what we have lost, but for preventing the evil results which a few more years of our blind folly will surely bring upon us.

To this end, I would not only urge upon every farmer to check by all means in his power, the indiscriminate destruction of our trees, but to preserve and foster the young growth as he finds it on his lands, and above all, to plant at least ten acres on each quarter section of our treeless area, as a systematic step towards correction of the evil.

Having occasionally met with the assertion that the original timber area of our State had not been impaired in the last forty years, I took pains to investigate this point, and upon consulting the latest reports to the Department of Agriculture at Washington, I find that seven counties show an average increase of nine per cent.; ten claim to have the same area; while a fair computation of the loss in the balance of the counties shows an absolute decrease of the entire area of the State of 50.2 per cent. during the stated period of time. The further fact that both quality as well as quantity is rapidly diminishing is shown in the decrease of over 10,000,000 feet of our lumber product in a single year.

As the reports are compiled from the best and most intelligent sources obtainable in each county, the data are as nearly exact as it is possible to obtain such information.

Treating upon this subject in general terms of Southern Illinois, which was formerly covered with timber of valuable varieties, such as oak, walnut, hickory and white-wood, one of these correspondents says: "About one-half of the area has been cleared and put under cultivation. Much of the timber was burned on the ground, and all that remains has been culled over and the best taken." Another, speaking of Gallatin county, says, in 1857, fully 80 per cent. of this county's area was covered with forests. The Wabash and Ohio river bottoms and valleys are covered with a growth of large, heavy oaks, black-walnut, ash and other valuable varieties. All these have long since been utilized for lumber, and but little economy displayed in cutting. At present rates of destruction and consumption, in ten or twelve years no timber worth naming will be found in the county. Not over 20 per cent. of the entire area is now in timber of any kind, and the new growth is not of the valuable original varieties.

Increased area is only reported from counties that had very little originally. Lee county is one of this class, and makes the only progressive report of the entire list. The correspondent says: "When I settled in this county, forty-nine years ago, about one-twentieth was in good timber. Most of this timber has been cut off, but very little of the timber land was cleared for farming uses; and as this has produced a new growth, there is now a greater area of natural growth than at the date of first settlements. Where the timber has been cut away, the severity of winter and storms at other seasons of the year has been intensified.

"Much tree-planting has been accomplished, and where this has been done on the prairies, and where the natural re-invested forests have again attained size, there has been a perceptible modification of climatic conditions."

This is a very interesting report, but I am hardly prepared to admit the possibity of producing climatic changes within such narrow limits. To create any effect it requires a larger area than that of a single county in which the timbered portion is but a small fraction of the whole, but, nevertheless, we must say that Lee county is moving in the right direction. Were all to do likewise, this inevitable consumption of our forests might be arrested instead of being encouraged by such statements as the one in which I am herein forced to controvert, for it lulls to a dangerous indifference at a time when our vigilance should be aroused.

Let us not then, ostrich-like, bury our light to avoid the apparition of danger and not yet believe it far away, for another generation may find itself battling with the consequences. For so surely as the forests are swept away, so surely will our mighty assistants, the clouds and the sunshine, the winds and the rain, refuse their further service in calling forth and nurturing our growing crops. But released from all control they will descend upon our fields only to blight and destroy. Instead of the gentle zephyrs of spring, we have called forth the black demon of the clyclone, and for the gentle and life-giving rain we have exchanged the terror of the mighty flood, alternated with the hot breath of the drouth. This is what we shall have to reap for so wantonly wasting that which we should have used with prudence, and upon which future generations have a claim as well as ourselves; for it certainly was never intended that we should destroy any of the elements upon which depend the welfare of posterity.

Baron Ferdinand von Mueller beautifully expresses the situation when he says: "I regard the forests as an heritage, given to us by nature, not for spoil or to devastate, but to be wisely used, reverently honored, and carefully maintained. I regard the forests as a gift entrused

to us only for transient care during a short space of time, to be surrendered to posterity again as unimpaired property with increased riches and augmented blessings, to pass as a sacred patrimony from generation to generation."

THE EUROPEAN LARCH.

Larix Europæa, Linn.

By DAVID NICOL CATARAQUI, Ontario.

There are three other species of this tree; one is a native of America, one of Siberia, and one of China.

Between the European and the American larches there is so little difference in their characteristics when young that they can hardly be distinguished as two different species, though in their growth and quality of their woods there is a remarkable difference.

In the American larch, *Larix pendula* (Black Larch Tamarac), the branches are stronger, the bark more inclining to yellow, the scars more slender and clustered, the leaves are more slender, narrower, and more glaucous, and the outer ones of each bundle shorter; cones only one-third the size, blunt, with scales scarcely exceeding twelve in number, thinned more shining, retuse, emarginate wings of the seeds straight, more oblong, narrower, and, together with the seed itself, of a more diluted gray color.

The European larch is a quick-growing tree, which rises to the height of sixty feet. The branches are slender and generally drooping, the bark of an ash-gray color, the leaves a little wider, bright green, all nearly equal, commonly more than forty in a bundle. The male flowers appear in the month of April in the form of small, purple cones; afterwards the female flowers are collected into egg-shaped, obtuse cones, which in some have bright purple tops, but in others are white. This difference is accidental, for seeds taken from either will produce both sorts. The cones are one and one-half inches long, with over thirty woody, stricted, rounded, entire scales; under each scale is lodged a brownish-gray seed, with two subtriangular wings somewhat bent in; tree generally grows perfectly straight.

No tree better deserves our attention than the larch, for it is one of the most valuable, which brings to the planter the quickest returns, with the most certain profitable results.

It possesses many valuable qualities, succeeds in almost every climate, thrives well on poor land, and is certainly destined to become a blessing to the nations that adopt it.

In countries where it is plentiful, its wood is preferred to all kinds of pine for almost all purposes; for ship-masts, yards, booms and gaffs, nothing excels it; and in Europe it is extensively used in ship-building; for doors and window-frames it is well adapted, because it does not shrink or warp. Joists and rafters made of it support an almost incredible weight, for it is exceedingly strong. Under water it becomes almost petrified and lasts for centuries. In Venice the piles on which many of the houses were built many hundred years ago, are said to be as fresh as when first put in; for canal lock-gates, no wood is equal to it. The wood varies in color according to age—that of the young trees is nearly white; as the trees grow older the wood becomes red, and is used for furniture-making. Shingles made of it are more durable than cedar or pine, the rosin which it contains is hardened by the air and becomes a smooth, shining varnish, which renders them impenetrable to moisture. For ornaments or farm fences, hurdles and gates, it is particularly suitable, because they can be made lighter and more durable than of any other kind of wood. In Italy it is used for carriage-building, for wainscoting, paneling and flooring. No wood takes paint better. It resists the bore-worm, and wherever strength and durability are required, larch timber is admirably adapted. A valuable product of the larch is Venice turpentine, which exudes spontaneously from the bark, but is more commonly obtained by boring a hole in the tree and inserting a pipe; this turpentine has always been considered useful in chronic rheumatism and paralysis, gravel-complaints, scurvy and pulmonic disorders.

The larch, when allowed plenty of room, makes a very handsome ornamental tree; its grand habit, with bright green foliage and purple flowers, makes it exceedingly beautiful. Placed on lawns surrounding the country villa it has a remarkably fine effect; being perfectly hardy it is never injured by severe weather.

PROPAGATION AND CULTURE.

Though the cones are at their full size in autumn, they are not quite ripe until the beginning of winter, which is the best time to gather them. The seeds in their cones will remain good for years, yet out of their cones they lose their vegetating quality in a few months; therefore, as soon as they are out of their cones, they should be mixed with dry sand and kept in bags or boxes until the season for sowing, which is as early in spring as the ground will permit. When the cones

are exposed to the sun a few days the seeds are easily threshed out. They should be sown in finely-made beds of sandy loam and covered with nearly half an inch of fine compost mixed with sand. If kept moist by gentle watering, they will begin to appear in four or five weeks; they must be partially shaded, because when newly up they are very tender, and a few hours of the full sun would completely destroy them. The following spring they should be picked out four or five inches apart or in rows; in the succeeding spring they should again be transplanted at wider distances, in rows three feet apart and fifteen inches apart in the row, and allowed to remain two years, by which time they will be four to six feet high, and of the proper size to transplant in exposed situations.

In favorable situations, when they are well protected, they do better when planted of smaller size, say three years from the seed; they start more freely and make more rapid progress. Experienced planters have long ago decided that the larch should be planted entirely by itself, because of its quick growth it soon outgrows all other trees, and when scattered thinly throughout the forest, the tender top shoots are apt to be damaged by high winds; they do best when planted thickly, because they shelter one another; they are often planted as near as three feet, and sometimes as near as two feet, but I would prefer the former distance; planted at this distance they rapidly shoot up straight, clean and healthy. At three feet apart an acre contains about 4,900; in this state they should be allowed to remain six or seven years, when they will have attained the height of twenty feet, if they have been well cultivated the first three or four years; they should then be thinned out for the first time by taking out every alternate row; the thinnings make the best quality of hoop-poles, worth at present about five cents apiece; 2,450 poles at five cents bring $122.50. Then being allowed to remain in this state about three years longer, they should have the second thinning. By taking out every alternate tree in the row, this would leave them six feet apart each way; the thinnings are now five to six inches through, and are worth ten cents apiece for boat masts and yards, supports in mines, etc.; 1,225 spars at ten cents brings $122.50. After growing five years at this distance they should be finally thinned out to twelve feet apart; the trees will now be seven to ten inches through and over thirty feet high, can be sawed into rafters, fencing, flooring, etc., and are worth at least twenty-five cents apiece; 612 spars at twenty-five cents brings $153. Now, if we suppose that the sale of poles and spars would be sufficient to defray the expenses of making and upholding the plantation, and that each tree still remaining on an acre, say fifteen years after planting, is worth only twenty-five cents, the value

of 612 trees is $153, there would be a handsome profit after allowing $2 a year for rent, which, for fifteen years, would be $30, and a great deal of land suitable for growing the larch would not rent for more than half that amount. Now the expenses cease, because the forest can be pastured with sheep without danger of injury to the trees; the increase in value is now much more rapid, the annual increase of the circumference of the trees will average one and one-half inches until they nearly reach maturity, which is in about fifty years after planting. The trees will then average thirty to forty inches in diameter three feet from the butt. Each tree will produce about 450 feet of lumber at $25 per 1,000, $11.25, less expenses for drawing and sawing, $2.25. It would surely not be considered extravagant to value each tree at $9; 612 trees at $9, $5,508, less thirty-five years' rent at $2 per acre; $70 from $5,508 leaves a net profit of $5,438. Be it observed that plantations of larch do not impoverish the land, but rather improve it. The annual deposit of leaves gives more nutriment to the soil than is taken from it by the trees.

Larch in its green state is almost incombustible, so there would be but little danger of destruction by fire, and there would be none if the dead branches were taken away.

A man would have to begin planting when young in order to realize the profits of a plantation, but he can, by planting soon, add much to the value of his estate, and the investment would probably be as safe as in bank stock. The price of lumber now is more than twice what it was fifty years ago, and there is every reason to believe that it will double in price before another fifty years has gone.

There are thousands of acres of land in Canada and in the United States which cannot be converted into arable land—an acre of which would give but poor summer maintenance for a goat—if judiciously planted with larch would soon become the most valuable land in the State, and would add immensely to the wealth of the nation.

WIND-BREAKS AND SHELTER BELTS.

Of all the questions that bear upon the subject of forestry, none has been discussed more frequently and more thoroughly than that of wind-breaks and shelter-belts, so that nothing new can be added. The only plea that is offered for referring to it again, is the neglect of heeding the advice and making use of the instructions given. A correspondent of the American Rural Home,* signing himself R. L. D., Jamestown, Ohio,

*American Rural Home, December 10, 1887.

speaking of wind-breaks, says: "As the wooded portions of the country becomes cleared up, the extent of these extensive openings must eventually affect the climate in no small degree. Already is this seen in the extreme changes of temperature, which fifty years ago were as rare as now they are frequent. The disastrous floods of the Ohio valley are also reminders that the vast wooded areas are disappearing. The vast quantities of leaves which yearly fell served as a sort of flood-gate to check the melting snows and early spring rains. Now the time required for a heavy rainfall to run off is only a few days. Formerly the water was gradually retained by these wooded reservoirs until summer was well on.

"Perhaps in no way is the absence of our forests more noticeably felt than in the piercing, biting winds of our recent winters. This is not a matter affecting merely the comfort of ourselves and our stock, but it is telling upon the winter wheat in many localities. For example, a field near here, well protected by timber, thrashed twenty bushels of wheat per acre, while another field, not protected, with soil and cultivation almost equal, thrashed about ten bushels per acre. Another field was partly protected. The part exposed yielded about five bushels per acre, and the part protected yielded about fourteen bushels per acre. Cultivation and soil the same all over the field.

"The lesson of this is obvious. We can not replace the old forests, nor would we if we could. We must provide some artificial means for protection. Wind-breaks, if placed on the sides toward the prevailing winds, will give material relief. We cannot expect to enclose our farms with trees when land is so valuable. This is often neither necessary nor desirable, when trees have been judiciously planted upon some knoll, or upon some hill-top over which sweep these blighting blasts of winter.

"Perhaps there is no tree better adapted to this purpose than the Norway spruce. It is a vigorous grower, and what is desirable, it grows tall. When growing in clusters it presents a well-nigh impenetrable barrier to the wind. Specimens planted in our yard ten years ago are now thirty feet high. For a wind-break they should be set about four feet apart. After they have attained a fair growth, cut out each alternate one. Where a grove of deciduous trees is desired to shield from the heat of summer as well as the cold of winter, I would advise planting basswood or linden. It has a rank growth, and makes a noble shade. Its bloom is a recognized source of honey, and its wood, being white and light, is always in demand for various wares. The black-walnut has been extensively planted in the west. Likewise the willow and cottonwood. It must be remembered that a much larger area of deciduous trees is required for this purpose than when evergreens are grown.

"It may seem a little inopportune to press this subject, but each suc-

ceeding decade sees the timber area gradually lessened. Even where the forests have not been the scene of wanton destruction, the most valuable trees are beginning to decay, and no steps are taken to replace them. When we do see the necessity for planting timber for protection it will be a matter of regret that we did not give this subject due consideration sooner."

FOREST-TREE PLANTING A NECESSITY.

With the gradual disappearance of our natural woods the necessity of planting artificial woods or forests becomes more obvious. Men in all parts of our land and in the varied situations feel that the time has fully come at which effectual steps should be taken to increase our wooded area, not only for the production of the various forest products, but even also for the amelioration of climate, for the protection of our water-courses, for shelter and for ornament. Thus Mr. G. W. Bailey, of Wellington, Kansas, says:*

"The annual destruction of our natural forests for railroad construction and lumber is tremendous, and unless something is done to check this wholesale destruction and to encourage the planting of artificial forests, it will only be a question of time until a large part of our country will be as barren as some of the older countries that passed through the same experience in the destruction of their forests. In some of our Eastern States springs and creeks which were once abundant, are now known and remembered as things of the past. Walnut lumber that I have known to sell for $8.00 and $10 00 per 1,000, is now worth in some of the eastern markets $200 per 1,000 feet, and scarce at that price. The time is coming, and it is not far distant, when black-walnut furniture will not be in the market, except at a high figure. Forest timber does not occupy the position it did before the era of railroads in the question of fuel. Then, unless coal could be had at local banks, it could not be used for fuel; and if timber was scarce, like it is here in Kansas, no one could live in a country so situated. The building of railroads has changed this materially. The facilities afforded for the transportation of coal all over our country, making it possible for people to live in a country comparatively devoid of timber, similar to a large portion of our own State. Who were to blame for the condition of the coal trade I am unable to say; whether it was the fault of the railroads or coal-dealers, or both, I do not know. Every farmer should take heed to the lesson taught by this winter's coal-famine; and if he has not already done so, plant trees for fuel and wind-breaks; not a few rows only, but several acres, so that in the future he may be independent of coal famines and their originators.

*In the Kansas Farmer, January 26, 1888.

"Contrast the farm home that is surrounded by beautiful groves of evergreen or oth r forest-trees, a nicely-kept orchard, shrubs and rose-bushes, with one that is too frequently seen—not a tree of any kind on it, barbed-wire fence around the barn-yard and feed-lots. Pass such a place as this while a full-fledged 'norther' is in progress, the wind blowing at the rate of forty to sixty miles an hour, with the thermometer at or below zero, the owner of such a desolate place at the time attempting to feed his freezing stock, and the wind, as if to punish him for his negligence, slapping him against the wire fence; his hat, leaving its shallow resting-place, darts across the barn-yard, striking the south line of fence, fluttering for a few moments, then loosened from the barbed-wire it starts at railroad speed over the boundless, billowy prairie to return again, perhaps, when the wind changes, while the luckless owner, trying to let go of the wire-fence with which he collided, curses the country, and resolves to sell out and go back to his wife's folks. And that is what he ought to do, having no more thought or interest in his own comfort and welfare and that of the poor dumb brutes that the Deity, by misplaced confidence, confided to his care. The above scene is sufficient without adding the discomforts that the good wife and children must necessarily put up with under such adverse circumstances.

"Now, go with me to the next house while the same blizzard is in full force. The owner of this place came to Kansas to stay; he has a nicely-arranged front yard seeded to blue-grass, with shrubs and evergreens scattered here and there, forming a fine contrast to the snow that lies around, between and beneath them, while the tall symmetrical cedars seem to say, as they sway to and fro by the force of the wind, 'Come and seek shelter behind the thick foliage of my swaying branches.' Not far from the house is a fine orchard of apple, peach, plum, pear, cherry, and a fair selection of small fruits, grapes, etc. The whole farm is enclosed and fenced into a number of fields by hedge, forming in winter a fine wind-break, and in summer, to any one who is in love with nature, the finest landscape scenery that an artist or any one else could wish to look at, when seen from the tower of a wind-mill. Good wind-break north of the farm and feed-lots, his stock is not shivering behind the fence-posts trying to get out of the wind. * * * * * In passing a farm home like this out on these broad, treeless prairies, you are led to exclaim, mentally, if not orally, 'Blessed is the man that planteth many trees.'"

TREES AND BLIZZARDS.

Prof. Charles E. Bussey, treating on the influence of trees upon blizzards, writes to the American Agriculturist for February as follows:

"I have been much interested in watching the effects of tree-planting upon blizzards. The blizzard drives along the surface of the ground, and it has for ages upon ages found no tree to halt or veer it. The settlers on the plains planted trees, however, and these trees now stand as obstacles to the full sweep of the ice-ladened wind. A few days ago, as a blizzard swept over the country, I passed through a loosely-planted grove of trees, cotton-wood, silver-maples, green-ashes, etc., and noted

with pleasure that among the trees the violence of the wind was greatly reduced, and the flakes of snow dropped lightly to the ground, where they rested as contented as though they had fallen upon the tree-covered hills of New England. As soon as I passed out of the grove I had to face again the furious flakes, driving horizontally in their mad career over the earth. As often as I passed through a little grove of trees, I found that I left the blizzard, but as soon as I emerged from the sheltering trees, the blast struck me again in all its fury. This bit of experience is duplicated thousands of times every day upon the plains. The tree-planter has routed the blizzard wherever he has set his little army of trees. The blizzard tyrant no longer rules at will over all the Mississippi valley. Wherever a grove has come into existence, there the blizzard's scepter has been broken. True, he rules as fiercely outside of the groves, but as these enlarge, his domain contracts. When once the groves are approximately continuous, and when once they have grown to greater heights, the blizzard will be a thing of the past. The settlers upon the plains need not fear the blizzard for more than half a dozen years, if he calls to his aid the friendly cotton-wood, maple, ash and elm. They alone can vanish this terror of the western winter. Let every settler's motto be: *Trees rather than blizzards.*"

PROTECTION FROM PREVAILING WINDS.

By L. B. Pierce,
Tallmadge, Summit county, Ohio.

The terrible storm of March 12th did not reach northern Ohio in a very aggravated form, but a very high wind prevailed on the following day, that made it quite disagreeable and uncomfortable for those compelled to be out. I was one of the unfortunates who were abroad in the storm, and I realized to a greater degree than ever before the value of protection around farm buildings. My own home is protected on the south and southwest by a neighbor's woods—a tract of about ten acres—while on the west is a high hill bearing an apple orchard. This orchard and the woods bound the doorway at a distance of ten rods; while on the northwest protection is obtained by a belt of evergreens commencing opposite the house and running north about ten rods. These evergreens have been planted seventeen years and were one foot high at planting. Part are Norway spruce, and part American arbor vitæ, and are the remains of a block of nursery trees. The arbor vitæs are on the east and could be entirely removed without seriously impairing the value of the protection furnished by the spruces, which are thirty feet high and occupy not more than two rods of ground in the widest place.

On the day in question the wind was blowing a gale not less than thirty miles an hour—and on a neighboring farm it was impossible to load hay or straw in the open

field (the experiment was tried), yet around my house and barn there was little indication of the terrible commotion going on outside.

Overhead the snow filled the air, and beyond the woods and trees was a noisy roaring; but this was all. The wind was a little north of west, and to the leeward of the evergreens one could walk with a loose summer hat and not have it blow off. The comfort resulting from the protection is often made a subject of congratulation by the neighbors and winter visitors, and several acquaintances have already planted evergreen belts with a view to deflecting the wintry blasts. In the illustration furnished by my own surroundings there is much that is due to location, that every one can not imitate. The woodlot on level ground flanked by an abrupt high hill is the work of nature, the orchard was planted long before, and with no view to protecting the buildings erected to the eastward, so that the selection of building site and the leaving of a portion of the evergreen block may be considered the only studied part of the present fortunate and comforable combination, yet there is not a farmer's home in the country which might not be greatly improved and ameliorated by a careful study of the situation and a judicious planting of a few of those trees which nature seems to have especially designed to ward off the wintry blasts. A single row of arbor vitæ or Norway spruce is about as efficient a protection from wind as a tight-board fence of the same height and width, with the advantage that it will not rot down or blow over. So efficient is this means of protection that many green-houses are protected on the west and north that were formerly shielded by high board fences, and the packing grounds of the large wholesale nurseries are made quiet and comfortable by the same means.

At the annual meeting of the Ohio Horticultural Society, Mr. J. J. Harrison, a member of a large nursery firm, said: "At the risk of being charged with an attempt to boom my business as a grower of evergreens, I will say that there is as much difference between the windward and the leeward side of an evergreen screen in a raw windy day as there is between a comfortable room and an open shed. Our packing grounds, protected by high screens of pine, spruce and hemlock, are comfortable and cosy when raw November or April winds are blowing so hard as to make work outside next to impossible."

In view of what I have written, I would advise every reader to make a beginning in the way of being protected from the prevailing winter winds, instead of waiting to some indefinite future time contingent on many uncertain plans. Begin at once in a small way. Get 50 or 100 small, once or more transplanted trees, and plant them in the garden, and let them grow to a size suitable to place in a wind-break. A Norway spruce costing five cents, eight or ten inches high, will in four years of good cultivation be three feet hight, and as good as a nurseryman would ask thirty or forty cents for. A scotch pine costing three dollars per hundred will in four years be as large as it should be to be transplanted safely. There will be a large saving in cost of boxing and shipping, and the value of an evergreen taken up and immediately set out within a few hundred yards is twenty times as great as that of one boxed and shipped a hundred miles. As to varieties, the Scotch pine, on dry, rich ground will give the quickest results. For beauty, permanence and heighth, Norway spruce is the variety to plant. Where a screen must be confined to a very narrow base—say six feet or less, the American arbor vitæ fills the bill, and it will thrive on very wet soils. For a slow growing screen of great beauty to plant close to the house, nothing can equal the American hemlock.

The manner and place of planting a wind-break must be decided by the location and prevailing winds. A single row is very efficient, but not as artistic as grouping. Where the side of a dooryard is in the direction of the wind, the best way is to widen it enough to admit the necessary planting, and then plant in groups lapping by each other. A liberal lawn with such a boundary would be a very profitable improvement to many fine farm residences.

There are many cases where the arrangement of the buildings is such as to give partial protection to the dooryard or barnyard, and a very little planting of such narrow trees as the arbor vitæ would very seriously cripple the power of high winds. The places where hats are blown off, and garments and umbrellas turned wrong side out, should exist around farm buildings only while an evergreen protection is attaining a size that will rob them of their unpleasant power.

EXTRAVAGANCE IN LUMBER.

The scarcity of the supply of timber seems to have little or no effect upon the primitive mode of cutting and handling timber. "The wanton waste of lumber," says an exchange in the Wood-worker,* "is often one of the striking features of the camps. In California it is still worse, only the largest trees are cut. Those measuring less than two feet in diameter are rarely touched but to ring and subsequently burn. In this country, even with the rare and valuable roots, we leave a large, unsightly stump, often the most dense and beautiful part of the tree. Generally speaking, the roots of these trees are not widely divergent, nor extremely thick, and it is strange the woodsman insists in cutting off so far above ground.

"Apropos of this may be mentioned a little experience of the writer: Two years ago, in the usual run of business, an old woodlot came in my possession. One part of this was the remnant of an old walnut forest, being thickly studded with stumps from three to four feet high, and literally strewn with tops and limbs from a foot in diameter down to four inches. Some of these were quite lengthy, but the larger ones were, of course, crooked and scraggy. To make a long story short, these stumps were grubbed out, the tops all trimmed, and the entire lot being taken to the mill by, the result being the interior of a new house was almost entirely finished with walnut. All the stationary stands, book-cases, wainscoting, stairs, balastrades, and the like, besides much of the furniture, was made from this walnut slash, besides which four thousand feet of beautifully grained lumber for special purposes was gotten out, which netted thirty-seven dollars per thousand feet. This one hundred and fifty dollars more than covered the cost of clearing, hauling and sawing, leaving the field perfectly clear and nearly ready for the plow.

"Of course the field was a good one; but all things considered, I venture the assertion that the aggregate profits from the slash and remains were greater than from the original forest, for the lumber from this particular field was sold in a bunch, mill-run, for twenty-five dollars per thousand, and, including first cost of the land, nearly three-fourths of this price must have been exhausted before the lumber was ready for market, proving conclusively that the lumberman of eight years ago did not hew close to the line. Whether he has learned to hew any closer may be demonstrated by visiting any section, where trees, even the more expensive, are being cut. The stumps and tops still cumber the ground, while the manufactories

*Wood-worker, December, 1887.

are continually making small pieces from the plank sawed long and wide; whereas, the trees would go a great deal further, and the results would be as good or better by working no closer and down lower, making shorter cuts, but producing much handsomer grain, as demonstrated in the foregoing. Besides, it should be borne in mind that these results may be materially exhausted by working at the start. Cutting low, below the ground, means a longer butt cut, always the best of these hard wood trees, and, in connection with the upper cuts, limbs and bends can often be worked in to much better advantage than after the main logs are cut.

"What is true regarding valuable lumber, applies with all its force, only in a modified form, to all varieties of timber. Any stump that shows unbroken soundness on the top represents a waste in proportion to its height. The peculiar construction of tools, and the nature of the average tree renders it nearly as easy and much more profitable to cut off at the very bottom, and there is no reason why the long, straight limbs should not all be worked up into merchantable goods, and that, too, at a fair profit to producer and consumer."

BIRDS AS FRIENDS AND ENEMIES.

Nearly every assembly of horticulturists discusses the bird question, and the Legislatures of the different States, when a bill for the protection of game is considered, show that there is a wide difference of opinion upon birds. Evidence as to particular species of birds is often of the most opposite and contradictory character. One speaker declares that he has watched certain birds, and is sure that a pair of them will catch a given number of caterpillars in an hour; another states that he has shot the same birds by dozens, and on examining the crops and gizzards, he found only the remains of fruits and grains, and not a vestige of an insect. The discussions about birds by different gatherings of fruit-growers and farmers, seem to result in little besides the presentation of evidence which bears equally in favor of and against different birds. One important point seems to be left out of these discussions. Whatever may be the food of the adult birds themselves, they almost invaribly feed their young upon insects, especially soft-bodied ones, such as caterpillars. The capacity of unfledged birds for food of this kind is something wonderful. Instead of discussing the questions whether this or that bird is useful or injurious to the farmer or fruit-grower, the question should be, "Is it on the whole more useful than injurious?" In other words, can we afford to pay the birds when mature, in fruit and grain, for the service they have rendered in devouring insects while young? It will be seen that the character of a bird, no more than that of a man, can be properly judged from a brief acquaintance. We must know it "by and large" before we can come to a proper decision. That such an investigation is attended with many difficulties, is shown by the report of Prof. Forbes, of Illinois, on the bluebird. He found on examining the stomachs of many birds that they contained little else than the remains of insects. A superficial observer would at once assert that the bluebird was amongst the most useful of birds, as it feeds almost entirely on insects. Prof. Forbes shows that the question is far from being a simple one. When he ascertained what kinds of insects were eaten by the bluebird, it was found that a large, but varying proportion of these were useful insects, that is, insects which feed on other and injurious insects. It will be seen from this that the

beneficial character of this bird becomes a complex problem. In one month it destroyed more useful than injurious insects. And had these useful insects been allowed to live, it is claimed that they would have destroyed many more injurious species than the bluebird did. We may state that observations in other months are more in favor of the bird, but cite this case to show the difficulties that surround the question. All will agree, however, that a very bad case must be made against the bluebird before we can be willing to dispense with its cheery spring notes.

This aesthetic side of the question will be considered by some, while others may look upon birds as robbers of grapes and other fruit, and to be shot on sight. A lover of nature, like George Husman, writes: "The redbird or cardinal, the thrush or catbird, also are very destructive, and it is still an open question with me, whether to feed them with sweet grapes or kill them and go without their sweet songs in the future?" And it always will be an "open question" with those best fitted to enjoy rural life. But the crow! He is to all such discussion what roast beef is to the dinner—the *piece de resistance.* It is only within a few years that speakers at the various meetings had the courage to say a word for the crow, but now it is admitted that his character is not so uniformly black as his plumage. In Northern gardens the white grub is, on the whole, the most injurious insect, when we consider the great variety of plants it attacks, ranging from grass to nursery trees, and that its work, being beneath the surface, is not suspected until the injury is done. The crow has a keenness of sense that allows him to detect the unseen presence of the white grub, and a fondness for that fat morsel that induces him to capture it. A few years ago we had a chance to watch the operations of an assemblage of crows on a grub-infested lawn. Their skill in finding and dislodging the grub should have been witnessed by all opponents of the crow.

Boys on the farm can do good service and find much to interest them in making careful observations of the relations of different birds to insect life.—*American Agriculturist.*

ARBOR-DAY SELECTIONS.

Arbor-Day, though observed with less ostentation than in former years, has lost nothing of its great importance. The demand of Arbor-Day literature, or selections from writers on forestal topics, to be read by teachers or pupils on Arbor-Day, has been on an increase which justifies the addition of a few more of such extracts.

No attempt has been made at a systematic arrangement. They follow in the order in which they were collected:

"*Is it time for us in Ohio to plant trees for timber?*" Yes, yes! truly and most emphatically, my dear fellow-countrymen of Ohio, the time *has fully come* when we, the inhabitants of this glorious possession, should, as a duty, plant trees for timber.

* * * * * * * * * *

The clearing of the land was a necessity for its occupation and application to agriculture. In this matter every landowner must be left free to decide for himself and for his own acres. No man nor set of men may hinder him from destroying or restoring his forests; nor can his movements be controlled by legislative en-

actments as in other countries, since the policy of our republic is that of *non-interference*. But we have also an axiom in our policy, that the best plans are ever those which conduce to the greatest good of the greatest number of the people; and whenever these may be presented in acceptable form, it is hoped and believed that such propositions will receive support.—*Dr. John A. Warder.*

In this rich and spacious land, it behooves us to be concerned rather with the preservation of our hills than their reconstruction by the toil of slaves; and I am ready to assert to you that there is no practicable method of holding the soil upon our steeper hills except the simple and natural method of covering them with wood. —*Dr. Dan. Millikin.*

The forest is a trust handed down to us from past ages, whose value consists not alone in the income derived from the wood, but also in the importance which it exerts, through its influence on climate and rainfall, on land culture. Its importance is not merely a question of the present day or of the present ownership, but it is also a matter which concerns the future welfare of the people. This is a truism beyond contradiction, but nevertheless it is daily disregarded by those who are indolent or selfish.—*Otto von Hagen.*

No forest without culture, no culture without forests.—*From the German.*

In looking at the question of tree-planting, I can scarcely conceive of it as a question of advantage or disadvantage. To my conception it is rather a question of position, and felt need, and not something that we may or may not do as we see fit, but something that is forced upon us as a necessity of the times in which we live.—*B. Gott.*

For three-quarters of a century we have been busily engaged in the business of lumbering; the time has now come when we must turn our attention to the business of forestry. The great wood-crop which nature lavished on our ancestors has been so diligently gathered that all our ingenuity will be taxed to continue the necessary supply for the growing wants of a rapidly increasing population.—*George B. Loring.*

"Men need to be taught that we have no moral right to follow blindly an instinct that leads only to present personal advantage, regardless of wide-spread future evils as a consequence; that we are but tenants of this earth, not owners in perpetuity; and that we have no right to injure the inheritance of those who succeed us, but rather a duty to leave it better for our having occupied it the allotted time. Men need to be taught to plant trees and their children to plant and love them. Owners of good lands in Maine or elsewhere, will, in the future, learn that their bleak fields, if judiciously planted with wood to the extent of forty per cent. of area, will produce on the remaining sixty per cent. more in all kinds of crops than the whole now does or can be made to do under any other possible course of treatment. Lands well sheltered can and do produce winter wheat in Maine as well as in New England or on the new lands at the west."—*Maine Board of Agriculture.*

The true basis of National wealth is not gold, but wood. Forest destruction is the sin that has cost us our earthly paradise. War, pestilence, storms, fanaticism and intemperance, together with all other mistakes and misfortunes, have not caused half as much permanent damage as that fatal crime against the fertility of our Mother Earth.—*Felix L. Oswald.*

It is enough to know that when we plant a tree we are doing what we can to make our plant a more wholesome and a happier dwelling place for those who come after us, if not for ourselves. As you drop the seed, as you plant the sapling, your left hand hardly knows what your right hand is doing. But nature knows, and in due time the power that sees and works in secret will reward you openly.—*Dr. Oliver Wendell Holmes.**

Other friends may be false and unreliable; the trees never.—*C. H., in Cincinnati Commercial, April* 29, 1888.

Old trees in their living state are the only things that money cannot command. Rivers leave their beds, run into cities and traverse mountains for it; obelisks and arches, palaces and temples, amphitheaters and pyramids rise up like exhalations at its bidding. Even the free spirit of man, the only thing great on earth, crouches and cowers in its presence. It passes away and vanishes before venerable trees.—*Landor.*

As yet little or nothing has been done among us in the way of forestry. Here and there a few trees have been planted, rather for ornament than for utility. The taste for the comfort and beauty of trees is growing, however, and of the thousands who daily travel along our great highways, few are they who cannot admiringly appreciate the improvement of tree-planting about the village stations, the groups of ornamental trees clustering around the rural homesteads, the lines of trees along the country roads, and on the boundaries of cultivated fields.

These efforts of individuals to restore the sylvan beauties of the land are worthy of all praise.—*Dr. John A. Warder.*

The forest is a long investment, but a certain and safe depository for our means, where bountiful nature is ever adding to the capital. The trees are growing while we are sleeping, and a well-managed forest is ever increasing in value; in it the rich lode may be worked continuously, the veins are never exhausted or cut off, like those of the mine, by horseback nor fault.—*Dr. John A. Warder.*

Tree-culture in this country is of great and growing importance; by a wise system of introducing new plants we can add to our national wealth and prosperity. But little has been done heretofore to learn about the habits and qualities of trees which can be made of great value in the mechanical arts, and for other purposes; indeed we know but little about our own trees.—*Horatio Seymour.*

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*Extract from a letter to Dr. John B. Peaslee.

Let us each in our humble way, strive to add our humble mite to the sum total of our engagements of this humble life below by planting a few trees to live and testify of us after our heads are laid low and our hands are still in everlasting rest.—*B. Gott.*

THE TREE AND THE BIRD.

Let us remember that most of the small and beautiful birds that warble among the branches of our trees are insect-eating birds, and are our most intimate and devoted friends, ever working for our interests. Let us encourage them and their friendly efforts for our good in every possible way, by planting trees for their convenience. The tree and the bird! How astonishingly beautiful these organized objects of kind nature are in their life and their work. Each of them are grand conceptions of infinite wisdom, and are worthy of our attention and careful study, that would fill volumes of scientific and useful teaching. The tree and the bird! How intimately close is the relationship that exists between the departments of the natural world, between the vegetable and the animal kingdoms, between the merest vegetable and the highly organized beauty of the air. This relationship is easily touched, the one ministering to the daily requirements of the other. Would we have birds to cheer and to bless us, let us plant liberally the trees they love.—*B. Gott, of Arkona, Ontario.*

I regard the forests as an heritage, given to us by nature, notfor spoil or to devastate, but to be wisely used, reverently honored, and carefully maintained. I regard the forest as a gift entrusted to us only for transient care during a short space of time, to be surrendered to posterity again as unimpaired property, with increased riches and augmented blessings, to pass as a sacred patrimony from generation to generation.—*Baron Ferdinand von Mueller.*

Keeping up a fit proportion of forests to arable land is the prime condition of human health. If the trees go, men must decay. Whosoever works for the forests works for the happiness and permanence of our civilization. A tree may be an obstruction, but it is never useless. Now is the time to work if we are to be blessed and not cursed by the people of the twentieth and twenty-first centuries. The nation that neglects its forests is surely destined to ruin.—*Elizur Wright.*

The farmer should endeavor to make his calling attractive to his children; he should introduce a little taste into his surroundings; it is not enough to own a house merely, but something should be done to make that house pretty, pleasing and attractive, a nucleus around which would gather the affections and sympathies of the entire family. The old homestead should be a thing of beauty as well as use; shady trees should overtop its rafters, bright flowers and fruit should find their place in the indispensable garden plot; in short, the whole should point it out as the well-loved home of a rational civilized Christian man, and not the abode of a mere animal. The children playing around the doorstep form their impression from their surroundings. The bleak and barren birth-place can produce no feeling of love, no wish to live the homely life of the farmer, but rather drives them from it and throw them into other pursuits.—*James Skead.*

The immense variety, the many and important uses, and the great beauty of our forests, must, naturally, attract the attention of an observer; and as the preservation and improvement of the forests, in their highest degree, are above private effort, require joint action, and must be effected on a large scale, on a system wisely begun and long continued by the men of one generation for those of the next; and by the application of science, taste and skill, not by one but by many men, not in one village or town, but in a country or state; it is wise for a government not acting merely for the present, but extending its forethought generously onwards, making its knowledge and wisdom an invested capital for future use, and desiring to do for coming generations, what they, when looking back, shall wish it had done; it is wise, prudent and patriotic for such a government to order a survey of the forests, among its other domains, that the people may know the sources of their wealth and its extent, and learn how to value, enlarge and enjoy it.—*Geo. B. Emerson, in Trees of Massachusetts.*

As moderators of the extremes of heat and cold, the benefits derived from extensive forests are undoubted, and that our climate is gradually changing through their destruction, is apparent to the most casual observer. Our springs are later, our summers are drier, and every year becoming more so; our autumns are carried forward into winter, while our winter climate is subject to far greater changes of temperature than formerly. The total average of snowfall is perhaps as great as ever, but it is certainly less regular, and covers the ground for a shorter period than formerly. Twenty years ago peaches were a profitable crop in Massachusetts; now we must depend on New Jersey and Delaware for our supply; and our apples and other orchard fruits now come from beyond the limits of New England. The failure of these and other crops in the older states is generally ascribed to the exhaustion of the soil; but with greater reason it can be referred to the destruction of the forests which sheltered us from the cold winds of the north and west, and which, keeping the soil under their shade cool in summer and warm in winter, acted at once as material barriers and reservoirs of moisture.—*Prof. Sargent.*

Trees are always beautiful, and the exhaustless resources of the Creator have been bountifully employed to endow them with ever-changing qualities of loveliness—qualities which are nowhere perhaps more strikingly illustrated than in our temperate climes, where the alternation of the seasons provide continual variation in the sylvan character of our landscapes.—*Francis George Heath in "Our Woodland Trees."*

In Primeval Woods.

This deep, primeval wood—how still!
Lo, silence here makes all his own;
Veiled shapes, with hands upon their lips
Stand round about his darkened throne.

The patient pleading of the trees—
How deep it shames the soul's despair!
In supplication moveless, mute,
They keep their attitude of prayer.

—*The Century.*

There is nothing that so strongly binds a man to a place as the bright memories of life due to cheerful homes and pleasant surroundings. These can not exist in a bleak and cheerless waste; they can only be secured by timely and judicious planting of trees.—*F. B. Hough.*

A Plea for the Forest.

"The Tree of the Field is Man's Life."—*Bible.*

Hail Forester with joy the dawn of day
That shall redeem our wood-land swept away!
Honor, and glory, and renown be thine,
Mortal thy legions, but their work divine.
The sylvan Deities shall bless the hand,
That rears their temples, saves our Native Land.

In other days ere Ruin held her sway,
Ere bandit hands relentless knew no stay,
How did the wild-wood's quickening pulses thrill
When wakening Phoebus slowly climb'd the hill,
And fragrant morn led forth the feather'd train
Of mellow songsters with their sweet refrain.
What witching charms in cloudless nights of June,
The forest breathed beneath a lambent moon;
Tranquil that breath, no jostling echoes rude,
To mar the dreamy sylvan solitude.

'Twas then the forest bloom'd an Aidenn wild,
But through its tangled depths the woodmen filed;
Each girdled trunk where blaz'd the fatal band,
Stood seal'd and deaden'd for the hungry brand.

Year after year the fields of waving grain,
Sprang like a Phoenix from the forest's flame.
Year after year Ambition's route was trac'd,
Through fields deserted and through woods in waste.

Then, sought the Seasons gently to reprove
The stoic man that Pity could not move;
First soft-eyed Spring, that ne'er was wont to stay,
Tardy she came and linger'd on the way;
And Summer sigh'd where once she smiling play'd
Chasing the freighted Zephyrs through the shade.
Pale autumn with her melancholy air,
Trailing her rustling garments everywhere,
View'd in the fields the discontented swain,
Whose double labor scarce increased his gain.
Despondent Winter later came and stay'd,
Helpless to guard where man would soon invade.
And in succession as the seasons pass'd
The only watch-word was "revenge" at last.

O Traitor to thy truest friend the tree,
Thy curse on it shall soon revert to thee!
The wave of ruin sweeping o'er the land,
Its tidal impulse started from thy hand.

Give back the robe to every barren hill,
What once was Nature's should be Nature's still;
Or else remorseless man thy fate is nigh.
Behold each year on earth, in air and sky,
All Nature's marshaling clans that augur woe,
Crowding their vans to press their mortal foe.

How sweep the frigid gales from north to south!
How fierce the summer sun! How long the drouth!
The lands once fertile now have ceased to yield;
Robbing the wood-land thou hast robb'd the field.

The protean clouds, the specters of the sky,
Mock at thy ruined lands and pass them by;
But when the fierce tornado leads them down,
In fiendish glee they flood the famished ground.
Once placid streams that gently sought the sea,
Now rush a moment madly—cease to be.
While tracings read in every sandy plain,
All will be lost in transitory gain.

As fair Aurora in the eastern skies
Dissolves the mists that vanish as they rise,
So science sheds effulgent rays of light,
Lifts every doubt and charms away the night.

And now she whispers in her earnest mood,
Gold is but dross when compar'd with virgin wood.
A Nation's wealth and hope and glory—all
Sink in proportion as her forests fall.

Then give the leafy robe to every hill—
What once was Nature's should be Nature's still.

Hail Forester with joy the dawn of day
That shall redeem our wood-land swept away!
Honor and glory and renown be thine;
Mortal thy legions but their work divine.
The sylvan Deities shall bless the hand,
That rears their temples, saves our Native Land.

JOHN E. DOUGLASS, JR.

HONEY LOCUST.

Gleditschia triacanthus.

By Prof. J. L. Budd,
Agricultural College, Ames, Iowa.

This fine native tree has received more attention in Europe than here. It has there sported into different varieties, with extremely varied habits of growth. This tendency to variation is exhibited in growing its seedlings, and we even notice that our native trees are varied in time of flowering, color of petals, habit of growth, and even in hardiness of trees when grown on the prairie. Our correspondence continually indicates a common belief that this is a true locust, and that like the black-locust, it is noted for sprouting and liable to the attack of the borer. We wish to repeat that it *does not sprout* any more than the maple, and that no form of insect has yet molested it, except a long-necked beetle often found on potato vines, called by Harris Cantharis conerea. Plants in nursery and young hedges are sometimes set back by these hungry fellows at work on their foliage. The only effect observed, aside from a brief check of growth, is that the plant so treated becomes more thorny than those unmolested. Several American writers, following Loudon more closely than is creditable, say: "The wood of the honey-locust, when dry, weighs fifty-two pounds to a cubic foot. It is very hard, splits with great *difficulty*, resembling in this and some other respects that of the common locust." Loudon really wrote, "Splits *with great facility*," which agrees with my practical experience. I have experience with this timber as a fence material, dating back nearly twenty-five years. Fence rails of that age, made from tough native timber, nailed on posts, have outlasted three sets of posts and two sets of red oak rails, and the locust rails are yet mostly good. These rails were split and nailed on in June and July. Posts made from native timber, seasoned one summer before setting, mixed with white-oak posts treated in the same way, lasted equally well. Some *long* honey-locust posts in this fence, when rotted off, were inverted and lasted ten years longer than a new fence. It is well to say that young timber rapidly grown on our rich prairie soil, will in no case prove as durable as our old native trees. But recent observations in the groves of Illinois of twenty-five years' growth, makes the fact evident that as growth is impeded by standing *thick*, and complete occupancy of the soil by roots, the

proportion of the sap-wood becomes small, and the heart-wood becomes firm and dry, as noted in the thick growths of the poplars. As fuel, the honey-locust rates in value with the red-oak.

The seed ripens in autumn and may be gathered any time during the fall or winter. But the sooner pods are gathered after falling to the ground the better. In Cedar county, on the Cedar river, and at many points on the Iowa, Des Moines, Missouri, and indeed most of the rivers of the State, pods may be gathered in quantity grown on thornless trees.

Before planting, scald the seeds severely. Part of them will swell. Sift these out with a coarse fanning mill sieve. Scald the remainder again; repeat scalding and sifting until all are swollen. The ground should be ready and the seeds at once planted. They will come up in two or three days if the weather be favorable, and their upright growth is so rapid that less care is needed in picking out the weeds from among the plants, than with any other forest-tree seedlings. Keep the weeds down with good culture during the summer. Take up the plants in the fall and heel in carefully where water will not stand. If left standing in the seed-bed, the plants are often injured during the winter. After the first year the plants are perfectly hardy, if seeds from our native trees be used. We may here note that the seed sold in the eastern markets is mostly many of the plants produced from foreign honey-locust seed, prove as tender in our climate as the peach-tree. No valuable tree in our list bears transplanting with as little check to growth as the honey-locust.

DEMAND FOR TIMBER.

The farmer, or any one who now undertakes to raise forests for the production of timber, need entertain no fears as to finding a market for whatever timber he may raise. The amount of timber annually used in the various arts is simply enormous, and increases from year to year. This great demand for timber of various kind causes the supply to decrease, which will necessarily result in a rise of the prices. In Europe the prices of lumber double about every twenty years. The great abundance of forests in this country, and the ready access to them, have heretofore prevented such an increase in the price here, but the time has come when we may confidently expect a similar advance in the prices of all timbers.

A glance at the development of the furniture trade during the last ten or twenty years will satisfy every one that the demand for timber has been constantly increasing, though iron has, in some instances, been used instead of wood.

What a draining this one of the many industries using wood will cause upon the forests, may be judged of from the following article which is taken from *The Furniture-worker*, Vol. VI, No. 3:

The Future of the Furniture Trade.

The furniture trade of the United States has assumed immense proportions, surprising alike to our foreign competitors and to ourselves. This trade, instead of decreasing, as some suppose it will, should have a steady and healthful increase in the coming years. There doubtless will come periods of depression. Indeed, we have for some little time past been experiencing a reactionary condition in the consumptive demand, which has served as a material check on the progress of the trade, but this, we believe, is but a brief interruption which will prove in the end as beneficial as it now seems hurtful.

In making our estimates of the future demands for furniture, we should not fail taking into account—first, the natural increase in its use; second, the displacement of old and worn-out or broken furniture for new and more artistic designs; third, the replacement of that destroyed by fire, etc. In another decade the population of this country will amount to at least seventy millions of people, and during that period our exportation of furniture must largely increase. It will be surprising if it does not double or treble. To supply the requirements of these additional millions of population, and this increased trade, there must be great demands upon our manufacturers.

It must be remembered, also, that with this increase in the demand there is a growing tendency to the more elegant, elaborate and artistic. This, of itself, makes an increase of requirement upon the manufacturers.

Old bedsteads are being constantly displaced by the folding bed, or that richly carved; the old wood-bottom chair must give way to the more elegant "easy chair," or "reclining chair," or "spring rocker."

The old wooden settee of the days of our forefathers has been put aside to make room for the more comfortable "sociable," or "*tete-a-tete.*" The things of the past are being revolutionized, and modern makes and modern ideas are brought into requisition. This wonderful evolution is going on all the while, and is increasing in extent yearly, as the number of improvements and designs multiplies. The demand for new furniture for replacing that in actual use is simply wonderful—so great, indeed, that few can fully appreciate the extent of this substitution.

Closer competion will force upon manufacturers more and more the necessity of doing better work—creating new designs. This will result naturally in an enlargement of demand, and consequently compel manufacturers to enlarge and improve their plants, substitute new machinery and better facilities for turning out work. This is true economy, and very many manufacturers fully understand the truth of our proposition.

The replacement of all the broken and worn-out furniture will afford our manufacturers a vast amount of work.

Think of all the public buildings, and pleasure and health resorts, and educational and charitable institutions, the furniture of which is now in use and deteriorating. The aggregate amount and value of all this defies calculation. What is its average life? At best but a few years, when it must all be replaced—some of

it right away—but all in the not far distant future. Think of this mass of furniture wearing out, being broken and destroyed, and this, too, in addition to that in use in nearly 11,000,000 of homes, and it must certainly occur to every reader that there is no more promising field in the world for the manufacture of furniture than this country. There is no reason for thinking this demand will grow less, for as our population increases and new settlements spring up, there will inevitably be a greater demand. There may be dull times in the future as in the past, but there cannot be permanent stagnation. The requirements of sixty to seventy million of active and industrious people will always be great, and as we have shown will furnish an increasing demand for the products of our furniture manufacturers. The manufacturer, the inventor, and the designer will ever be important factors in our nation's trade.

ON THE VARIABILITY OF THE ACORNS OF QUERCUS MACROCARPA, *Michx.*

By JOSEPH F. JAMES,
Prof. of Botany and Geology at the Miami University, Oxford, O.

It is a well-known fact that all forms of life are subject to variation, but to what extent the variation is carried is a subject of much discussion. The almost universally acknowledged belief now is, that all the species of any one genus are the descendants of a common ancestor, and more remotely, the different genera of an order are likewise the modified descendants of a single form. Yet, notwithstanding this general belief, many are unwilling to admit that we see in the life about us, any tendency toward the formation of a new species.

Now it is much to be doubted if such a thing as a species has any existence in nature. The term is one which scientists have agreed to apply to an assemblage of individuals, which have certain characteristics in common; but certain of these characteristics may be wanting in some individuals; and in a large number of individuals of one acknowledged species, we may and do find certain features changing so that one species merges into another so imperceptibly that the line to be drawn between them is indistinguishable. This has come to be recognized to such an extent that many naturalists now hold that the true method of classification is to group around certain centers, forms which have something in common. To say that this or that form belongs to a certain group of which some other form is the type.

It is not the purpose here, however, to enter on a discussion of the meaning of the term species, nor of the limits of species, but to call attention to certain variations which have been noticed in a single species of plant, viz.: the *Quercus macrocarpa*, Michx., the Bur or Mossy Cup Oak. This tree, one of the finest of our Oaks, is remarkable for the peculiar moss-like fringe which borders the cup of the acorn, and which is at present in no other species of *Quercus* of North America. The leaves of the tree are very variable, both in size and in outline. They are lobed, cut, pinnatifid and parted in such various degrees that it is hardly possible to find two of them alike; and leaves from the same tree would, if found in a fossil state, be ascribed to entirely different species.

It is, however, to the acorns which I wish to call attention. According to Mich-

aux, these "are oval, and inclosed for two-thirds of their length in a thick rugged cup, which is generally bordered along its upper edge with fine, long flexible filaments. Sometimes, however," he adds, "in compact forests, or in very temperate regions, the filaments do not appear, and the edge of the cup is smooth and bent inward."* Gray says,† that the cup is "deep, thick and woody, conspicuously imbricated with hard and thick-pointed scales, the upper ones awned, so as usually to make a mossy fringed border; acorn broadly ovoid, half immersed in or entirely inclosed by the cup. . . . Cup very variable, especially in size, from 9″ to 2′ across.

The series of sketches I have prepared illustrate this variability of the acorn in a remarkable manner. Figure 1 is the type form with the acorn two-thirds immersed in the cup, and the latter furnished with a delicate fringe on the upper edge. Figure 2 is from a specimen from Hardin county,‡ Ohio, in which the acorn is almost wholly concealed in the cup, and the fringe almost hides it from view. Figure 3 is a top view of a widely different form. In this the cup is nearly an inch and a quarter across, and the fringe projects at least half an inch all round, making it two and a quarter inches in diameter. The acorn projects very slightly above the rim of the cup. Figure 4 goes again to the other extreme, for here we have a very small acorn, the cup slightly fringed, and leaving only a small portion of the apex of the nut exposed. In figure 5, we have a cup one and a half inches in diameter, in which the fringe has grown down inside the cup, lining it all around, and forming a soft bed for the nut to rest on.§ In figure 6, we have an acorn in which the cup conceals three-fourths of the nut, and is almost destitute of any fringe. In figure 7, we have an entirely different form again, for here the cup conceals about one-half the acorn, the walls are very thin, and it is entirely destitute of any fringe whatever. Figure 8 represents the variety *Olivæformis*, Gray, from Hardin county, Ohio. Here we see an oblong acorn, with a cup half concealing it, and with a very slight fringe.

Thus we have here eight different looking acorns, all known to belong to the same species, and more than one to be found, perhaps, on the same tree. There are all gradations from no fringe at all on the cup, to one which has a fringe half an inch long. The cups are shallow and deep, thick and thin, extending half way up the acorn, reaching to its apex, or almost entirely concealing it. ‖

It seems to me that in this marked tendency to variability in the *Quercus macrocarpa*, we have the beginnings of what might, in the course of time, come to be considered several distinct species. If the tree springing from the acorn distinguished by the thin-walled cup, destitute of fringe, should produce a preponderance of acorns of the same character, and if this character should be transmitted from generation to generation, as we have every reason to suppose may be the case, then in the course of time a new variety or species will have arisen. If, further, the acorn with the long fringe produces in its turn a tree bearing acorns like the original one, and its

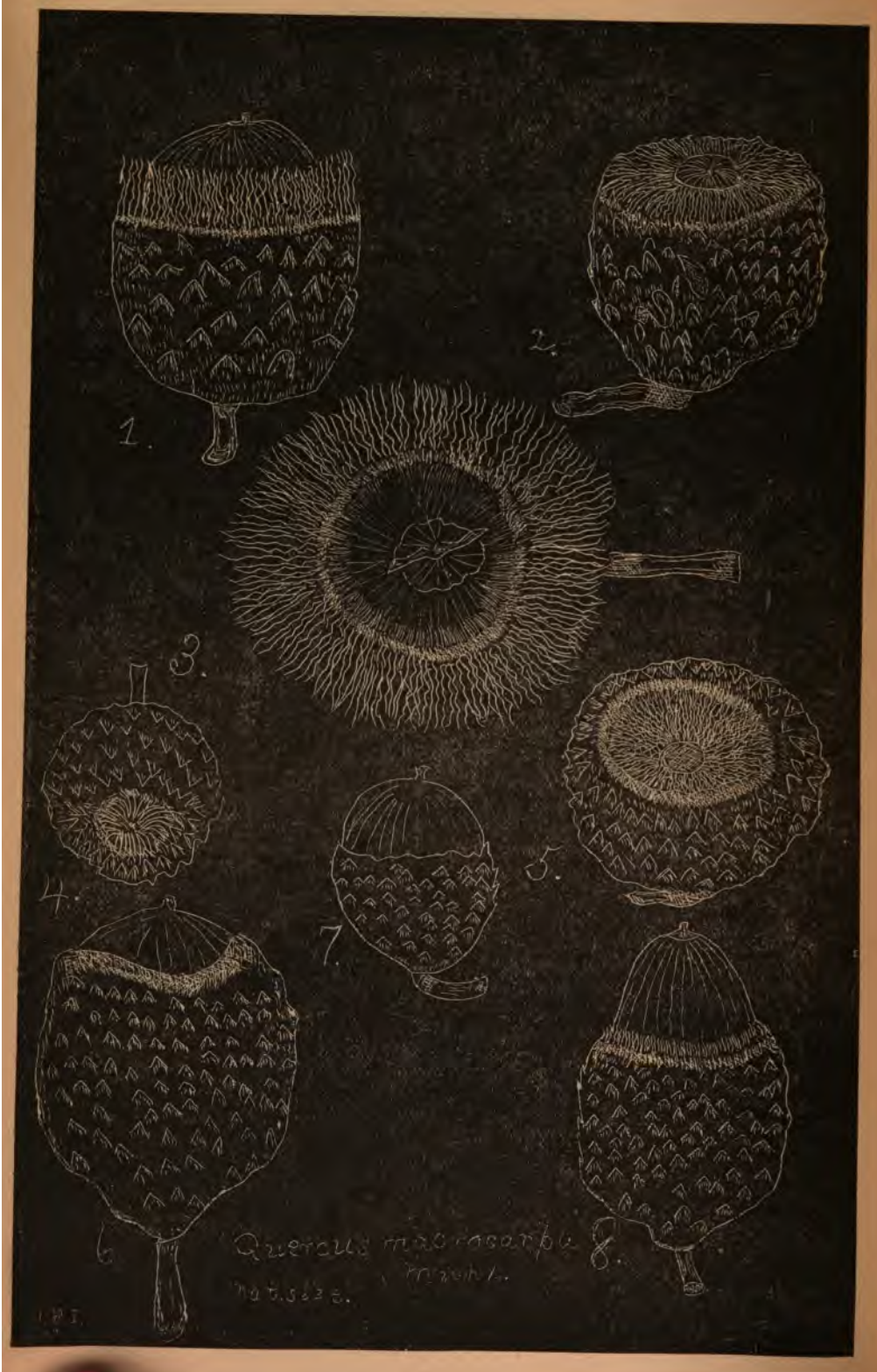
*North Am. Sylva, vol. i, p. 84. The figure given by Michaux shows the character admirably.

†Manual, p. 451.

‡This and the following figures are taken from specimens given me by Dr. John A. Warder. Specimens from which figs. 2 and 8 were made, were collected by Mr. Hampton, of Hardin county.

§The nut is not shown in the figure, only the cup showing the fringe lining the interior of it.

‖The oak said to more closely resemble our *Q. macrocarpa*, which, by the way, is principally confined to the Mississippi valley, is the *Q. cerris* of Europe. This is as variable as the *Q. macrocarpa*. It is a native of middle and south Europe, and of western Asia, and Loudon in his Arboretum et Fruticetum Britannicum, remarks on the tendency to sport which is characteristic of it. He gives no less than fourteen varieties of it, and these vary from forms with pinnatifid or sinuate leaves, to dentate, to subevergreen, and even evergreen leaves. He says nothing about any variation in the fruit.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Quercus macrocarpa
Michx.

characters be also transmitted and finally fixed, another and a widely different variety or species from the thin-walled variety will have arisen. If now we imagine through any cause all the immediate forms to become extinct, and only the extremes to remain, it would be hard to realize that two such different looking forms could have arisen from one which produced both kinds of acorns.

Such facts as have been given in this article, and cases of the same kind are by no means rare, should make naturalists careful how they make new species. It is much more creditable in the present state of our knowledge to reduce the number of species than to increase it. For it is very much easier to arbitrarily establish the bounds of a species, and to say this is one, and that another, than to say this species and that species are forms which in the past were closely connected; and to say that they ought now to rank as varieties, either one or the other, or else of some other species possessing characters common to both.

The following article, which is especially written for this report, although speaking of the forestal relation of Dakota, is one of general interest, and well merits the careful perusal of every one interested in forestry. A. L.

FORESTRY IN DAKOTA.

By WATSON E. BOISE,
Bellevyria, Dakota.

In presenting a few thoughts on forestry in Dakota, I wish first to speak of the native forests. While Dakota is essentially a prairie country, quite a number of the counties had years ago considerable timber, sufficient, indeed, to call for the erection of saw-mills, and resulting in quite a large local output of lumber.

Still I do not think that the forest area amounted to more than two per cent. of the whole area of the territory at the time of the first settlements. For the most part this growth consisted of a fringe of scragly trees along the bluffs and in the ravines adjacent to the rivers. Streams, of any size worthy of mention, quite generally had this fringe of timber, consisting principally of oaks, cotton woods, box elders, balm of Gileads, elms and the choke cherry. With the incoming of settlers began the slaughter of these "tree fringes" for fuel, and now there is in most sections hardly enough left to show what was once there.

But there seems to be good reason to believe that, in a former age, this territory was much more thoroughly covered with forests.

On my farm is a large coulee. Taking off the black loam of about 15 inches in the "bottom," *i. e.*, between the bank of the coulee and the bluff, we find a subsoil very easily dug and seemingly veritable leached ashes, both in color and appearance, and I am of the opinion that an analysis would prove it to be such.

In years past coal has been found here and there in small quantities along the Missouri river, more especially to a considerable extent. It has been quite extensively mined for at least five or six years on the line of the Northern Pacific Railroad, some distance west of Bismarck. The past two or three years many discoveries of coal have been made, indicating that these deposits are of considerable extent. Indeed, it is the sanguine expectation of many that this has solved the

fuel question for us. The coal is usually lignite; when properly used proves a very good fuel, and is taking the place of other fuel, to a considerable extent, in certain localities.

Of tree-culture in Dakota as a whole, I cannot speak very encouragingly, though many of those who are skilled in this work and give much time to experiments are quite enthusiastic, and would also make us see (in our mind's eye) great belts of timber on these illimitable prairies to be grown within the period of ten or twenty years. In the Southern and older settled portion much of this work has been done, and with such a good degree of success as that groves of trees of considerable height and size are quite frequent.

But this is not true to any extent in North Dakota. This is partly due to the fact that we have not lived here as long, and are only just learning how to do the work properly. Yet I am inclined to think that we can *never* hope to be as successful as they, and especially because our growing season for trees is very short. At least other conditions must be very favorable to compensate for the shortness of the season.

Of the many causes leading to failure perhaps none is more potent than the fact that very few have been rightly handled, and this poor handling comes in in many ways.

It has been the custom of very many, who have come to stay only a short time, to take a tree claim, because it can be held without residence. Usually these speculative holders, holding the claims as long as possible without doing any work, have sold out their right to some one else who, quite likely, will do likewise. It is thus often the case that tree claims are held for a considerable term of years without a farther fulfilling of the timber culture law than the mere breaking of five to ten acres, often not even this.

Even when these non-residents desire to properly plant and cultivate groves on their clams, they must usually depend upon whomsoever they can secure to do the work. This work is being done for the pay, not for the laudable desire of doing a good job, and in the nature of the case this can only result expensively and disastrously. There being only one-fourth out of the four in a section to be taken as a tree claim, and many of these taken by speculators, the true claims are taken far ahead of actual settlement, and only a few residents have them adjoining their homesteads, and commonly not nearer than ten to fifteen miles, and often twenty to thirty.

If only actual residents could hold tree claims (and this, I suppose, was the real intent of the law) many more would have them adjoining their farm. They would then take pains in caring for them, and their efforts would be much more successful. But when they are far away, and other work is pressing, if tended at all it is likely to be only once, or at most twice a season, and that done late and in a slipshod way.

Another of the greatest difficulties arises from the law itself, as it requires the planting of trees or seeds after only one year's cultivation. To be successful more time must be given to secure a thorough rotting of the tough prairie sod, a thorough pulverization of the soil, and that to a good depth, at least eight inches.

Seeds have often been used because cheaper and more easily planted. True, this work has too often been done too carelessly, either because the holders only wish to have something to swear by, or because they thought the seeds would grow if only got into ground as it may chance. But however well done, sowing seeds has, in most cases, proved to be poor economy, as the ground is quite often too dry to give them a thrifty start, and cuttings fare much the same.

As work rushes in the spring, tree cultivation is too generally put off, being

very seldom begun soon enough, and is often continued too late, not leaving the trees sufficient time to properly mature the season's growth.

Again, many young groves are not properly protected against prairie fires, and are thus destroyed. They are killed by drouths in summer and cold in winter. The dry, hot winds greatly aid the drouths by rocking and unsettling the tree and loosening and drying the soil. Winter-killing is often caused by the winds in winter blowing the soil away from the roots, and this is especially the case when the soil about the tree is free from weeds or mulching.

These experiences have taught us that careless work will not and cannot succeed. They have taught us that it is only by setting out with the determination to do our best, that we may one day sit beneath the shade which our hands have helped to rear. Experience proves that we should proceed somewhat as follows: Secure small well-rooted trees and heel them in the fall that they may be ready for early planting in the spring.

Because of the shortness of the season, cultivation must begin early and must be frequent, that the trees may be stimulated to an early and rapid growth. Cultivation should cease by June 15th—certainly before July 1st—that the season's growth may bear ample time to mature before the early frosts, also to give the weeds time to grow to hold the snow in winter. Mulching helps the growth wonderfully and aids the weeds in holding the snow. To the careful planter the greatest cause for anxiety has come from fear of drouths and winter-killing. Drouths are to be feared perhaps quite as much as winter-killing, and plenty of mulching will, to a large extent, remove the dangers of both.

Tree culture has proved a failure in most cases. It is only the few that have succeeded. The N. P. R. R. tried for two years, I think, the planting of large numbers of small trees along its line in Dakota to take the place of snow fences in protecting the "cuts." They then gave it up as an unprofitable experience.

Do I then think that we shall not succeed to any considerable degree? By no means! Already where the country has been settled eight to ten years nice young groves may be found. Where there is something of a protection in the shade of hills or where there are belts of timber, or in towns, the largest measure of success is to be found. Some sort of protection from the northwest winds, especially is dsirable. The greatest success, too, has been with our native trees, cotton-woods, box-elders and white-ash. White-elm, white-willow and hard-maple have proved less successful.

Quite recently considerable attention has been given, by nurserymen and others, to the growing of evergreens. With protection for a couple of years it is hoped that they may become the tree for wind-breaks. Of evergreens Norway spruce, native white-spruce and Scotch pine seem to be more promising.

There must still be years of experiment to learn the hardiest kind of trees, and those otherwise best adapted to our needs. This stage to be followed by a considerable period of patient waiting, under the direction of skillful hands, before we can see these aforetime bleak prairies thickly dotted with thrifty groves, alike useful and grateful to the eye.

THE SUGAR MAPLE BORER.

Glycobius speciosus—(Clytus speciosus, Gay).

By L. F. ABBOTT,
In American Rural Home.

There are a few beetles which are not ugly. In fact there are a number of species that are very beautiful to look upon when beauty is under consideration, but when the destructive habits most of them inherit are the subject of thought, we lose something of our respect for their beautiful dress and wonderfully formed proportions. Of this latter class is the beetle of the sugar-maple borer, the old Clytus speciosus (beautiful Clytus) of Gay, but now given the name of Glycobius speciosus. Most entomologists mention this beetle in their writings, but nothing new seems to have been found out concerning this insect since Harris wrote of it thirty years ago, except to dress it up in a new name and pass it along with Harris' old description.

The maple borer is much more common than is generally supposed. Often our beautiful rock-maple shade-trees have a sickly look in a portion of their tops. Upon some of the branches the leaves assume a fiery red hue, and after a while the leaves wither, and the next year the dry branches betoken disease at work in a vital part of the tree.

While these appearances may not always be the effect of the depredations of our Glycobius, or maple tree borer, they are very frequently the result of his presence in the trunk, where he has mined beneath the bark, cutting off the circulation of the sap to a degree highly injurious to the welfare of the tree.

Injuries to our maples, often laid to the charge of the Tremex columba, are due to a lodgement made by the beautiful Glycobius, puncturing the sound wood until partial decay affords a favorite breeding place for the Tremex.

Inspections of the maples in many localities will reveal the presence of the larva of the Glycobius speciosus or the work of destruction they have accomplished, the insect having matured and flown away. Then the question arises, if these beetles are so plentiful, why are they not oftener seen and captured? There is something curious about that. Undoubtedly thousands mature every summer and take wing. Many probably fall a prey, while in the larva state, to the unerring instinct of the little, but much maligned woodpecker, who taps Glycobius' burrow, harpoons him in the back and makes a breakfast of him these cold

December days; or perchance Mrs. woodpecker quiets her hungry youngsters in summer with sweet morsels from his carcass.

Then, again, the Pimpla lunator, with its borer more than four inches long, with instinct as wonderful as that of his feathered enemy, although an insect of but a day, as it were, like the victim it pierces; she, with more than human sagacity in this respect, drills her hair-like ovipositor through perhaps two inches of solid wood at the exact spot where the larva of Glycobius burrows, pierces her victim and deposits an egg, which hatches, and Glycobius becomes the host to foster the little Pimpla larva until it reaches maturity, when he emerges a full-winged Pimpla; but Glycobius never rallies from such usage, but dies with consumption in the midst of his riotous living.

But it is a little singular that so few of these beautiful beetles are seen the latter part of summer after they have taken wing. The specimen I have before me, captured more than a dozen years ago, I might have duplicated perhaps half as many times in those years, but often a whole season will pass without once coming across this insect. This beetle is quite likely to be remembered from its black and gold markings and the peculiar golden W on the base of its wing-covers. This letter we'll take to be the initial to the appropriate motto—" Winning, Wicked Wretch."

This beetle attains a little more than one inch in length, and reaches maturity in July, soon after which the female deposits her eggs in the crevices of the bark of the maple. Close examination of the surface of the bark will disclose the whereabouts of the young larva as it penetrates the tree, by its sawdust borings, but their presence can be more readily detected the summer following, after the larva have attained some size. It should then be hunted and destroyed.

Preventive measures to deter the females from depositing their eggs, or destroy them after they are laid, I believe might be employed by applying to these trees, two or three times in July and August, an emulsion of soap and kerosine oil or crude petroleum.

The larvae of Glycobius, like most of the wood-borers, takes three years to mature. As it has a voracious appetite and assumes quite large proportions—nearly an inch and a half in length and a third of an inch broad—the mischief a single specimen will work in a tree is considerable; it is generally the case, however, that a pair will start from about the same point, one burrowing just beneath the outer bark to the right, the other to the left, taking an oblique downward direction, and frequently I have known trees six to eight inches in diameter to be girdled within an inch or two before the insect turned within the solid wood.

On young, smooth-barked trees, these burrows are quite readily seen by the practiced eye, but on older trees, when the outer bark has assumed a rough condition, it is more difficult to find and follow their excavations.

The only remedy after the worms have made a lodgement is to find their burrows, and with chisel or small gauge cut them out.

MISCELLANEOUS ITEMS OF INTEREST TO FORESTERS.

TO MEASURE THE HEIGHT OF A TREE.

To approximately estimate the height of trees requires considerable practice. Some years ago, when walking through one of the parks in the city of Cincinnati, I met two of my friends looking at a tree, and discussing its height. "It is about 100 feet high," said the one. "I think it is about 80 feet," said the other. We then measured the tree, to find that it was not more than 60 feet high. In my younger years, I knew a forester who was noted for his ability in accurately estimating the height of trees by simply looking at them. Upon being questioned how he acquired this ability, he replied, "by practice." He used to estimate the height of trees and then measure them. The following brief article taken from *Youth's Companion* tells how the height of a tree may be ascertained:

"There is a very simple way of measuring the height of a tree, which can be practiced by any one on a sunny day or bright moonlight. All the apparatus that is necessary is a straight stick of any length. Draw a circle with a radius (half the diameter) or a little less than the length of the stick. This will be done by holding one end of the stick, say two inches from the end, and moving the other end around, making the circle with a knife or chip. Then place the stick in the ground exactly in the center of the circle, perfectly upright, and press it down until the height of the stick is exactly the same as the radius of the circle. When the end of the shadow of the stick exactly touches the circle, then also the shadow of the tree will be exactly in length the same measurement as its height. Of course, in such a case, the sun will be at an exact angle of forty-five degrees. Measurements of this character can be best effected in the summer, when the sun is powerful, and has reached to a good height in the heavens, and when the trees are clothed with living green, so as to cast a dense shadow. To many to whom this idea may not have occurred it might be made annually a matter of interest thus on warm summer days to take the height of prominent trees, and so to compare growth from year to year."

DROUGHTS.

The droughts of Eastern America are reported as follows:
In 1621, 24 days in succession without rain.
In 1630, 41 days in succession without rain.
In 1657, 75 days in succession without rain.
In 1662, 30 days in succession without rain.
In 1674, 45 days in succession without rain.
In 1680, 81 days in succession without rain.
In 1694, 62 days in succession without rain.
In 1705, 40 days in succession without rain.
In 1715, 45 days in succession without rain.
In 1728, 61 days in succession without rain.
In 1730, 92 days in succession without rain.
In 1741, 72 days in succession without rain.
In 1749, 108 days in succession without rain.
In 1755, 42 days in succession without rain.
In 1762, 123 days in succession without rain.
In 1773, 80 days in succession without rain.
In 1791, 82 days in succession without rain.
In 1802, 23 days in succession without rain.
In 1812, 28 days in succession without rain.
In 1856, 24 days in succession without rain.
In 1871, 42 days in succession without rain.
In 1875, 27 days in succession without rain.
In 1885, 20 days in succession without rain.

The longest drought reported in America was in the summer of 1762; no rain fell from the first of May to the first of September, making 123 days without rain. There are seven droughts reported in the seventeenth century averaging 51 days each, ten in the eighteenth century averaging nearly 75 days each, and up to the present time six in the nineteenth century averaging 27 days each.—*Forest Leaves, Sept.*, 1886.

THE BEST FUEL

The following quotation from an anonymous writer will be of interest:

"Wood is the healthiest, because it contains a large amount of oxygen; coal has none, hence in burning it the oxygen necessary for its combustion must be supplied from the air of the room, leaving it 'closely' oppressive. A coal fire will go out unless it has a constant and large supply of air, while wood, with comparatively little, having a large supply within itself, turns to 'live coals.' Close-grained, heavy wood, like hickory or oak, gives out the most heat, while pine and poplar,

being open grained, heat up the quickest. The value of fuel as heating material, is determined by the amount of water which a pound will raise to a given temperature; thus one pound of wood will convert forty ponnds of ice to boiling water, while a pound of coal will thus heat nearly eighty pounds of ice—cold water; hence, pound for pound, coal is as good again for mere heating purposes as wood is as good again as peet, which is the product of sedges, weeds, rushes, mosses, etc. But if a ton of coal, that is, 28 bushels, or twenty-two hundred and forty pounds, cost five dollars, it is about equal to the best wood at two dollars and a quarter a cord. Coal at twelve dollars and a half a ton is as cheap as wood at five dollars and a half per cord. It would be more equitable if wood was dry to sell it by the pound. Such is the custom in France. For heating sleeping apartments, wood should be used."

MARCUS BULL'S TABLE—SHOWING THE HEATING QUALITIES OF WOOD.

Number.	Common names.	Botanical names.	Specific gravity of dry wood.	Weight of dry wood in a cord.	Products of charcoal from 100 parts of dry wood, by weight.	Specific gravity of dry charcoal.	Pounds of charcoal in one bushel.	Pounds of charcoal from one cord of dry wood.	Bushels of charcoal from a cord of dry wood.	Time that 10°(F.) of heat were maintained by combustion of 1 pound.	Percentage of value for fuel, Shellbark Hickory being 100.
										h.m.	
1	White Ash	Fraxinus Americana	0.772	3,450	25.74	0.547	28.78	888	31	6.40	77
2	Apple tree	Pyrus malus	0.697	3,115	25.00	0.445	23.41	779	33	6.40	70
3	White Beech	Fagus sylvatica	0.724	3,236	19.62	0.518	27.26	635	23	6.00	65
4	Black Birch	Betula lenta	0.697	3,115	19.40	0.428	22.52	604	27	6.00	63
5	White Birch	Betula alba, var. populifolia	0.530	2,369	19.00	0.364	19.15	450	24	6.00	48
6	Butternut	Juglans cinerea	0.567	2,534	20.79	0.237	12.47	527	42	6.00	51
7	Red Cedar	Juniperus Virginiana	0.565	2,525	24.72	0.238	12.52	624	50	6.40	56
8	Chestnut	Castanea vesca, var. Americana	0.522	2,333	25.29	0.379	19.94	590	30	6.40	52
9	Wild Cherry	Cerasus Virginiana	0.597	2,668	21.70	0.411	21.63	579	27	6.10	55
10	Dogwood	Cornus Florida	0.815	3,643	21.00	0.550	28.94	765	26	6.10	75
11	White Elm	Ulmus Americana	0.580	2,592	24.85	0.357	18.79	644	34	6.40	58
12	Sour Gum	Nyssa multiflora	0.703	3,142	22.16	0.400	21.05	696	33	6.20	67
13	Sweet Gum	Liquidambar styraciflua	0.634	2,834	19.69	0.413	21.73	558	26	6.00	57
14	Shellbark Hickory	Carya alba	1.000	4,469	26.29	0.625	32.89	1172	36	6.40	100
15	Pignut Hickory	Carya porcina	0.949	4,241	25.22	0.637	33.52	1070	32	6.40	95
16	Red-heart Hickory	Carya	0.829	3,705	22.90	0.509	26.78	848	32	6.30	81
17	Witch Hazel	Hamamelis Virginica	0.784	3,505	21.42	0.368	19.36	750	39	6.10	72
18	American Holly	Ilex opaca	0.602	2,691	22.77	0.374	19.68	613	31	6.20	57
19	Hornbeam	Carpinus Americana	0.720	3,218	19.00	0.455	23.94	611	25	6.00	65
20	Mountain Laurel	Kalmia latifolia	0.663	2,963	24.02	0.457	24.05	712	30	6.40	66
21	Sugar Maple	Acer saccharinum	0.644	2,878	21.43	0.431	22.68	617	27	6.10	60
22	Soft Maple	Acer rubrum	0.597	2,668	20.64	0.370	19.47	551	28	6.00	54
23	Large Magnolia	Magnolia grandiflora	0.605	2,704	21.59	0.406	21.36	584	27	6.10	56
24	Chestnut White Oak	Quercus prinus palustris	0.885	3,655	22.76	0.481	25.31	900	36	6.30	86

MARCUS BULL'S TABLE—Concluded.

Number.	Common names.	Botanical names.	Specific gravity of dry wood.	Weight of dry wood in a cord.	Product of charcoal from 100 parts of dry wood, by weight.	Specific gravity of dry charcoal.	Pounds of charcoal in one bushel.	Pounds of charcoal from one cord of dry wood.	Bushels of charcoal from a cord of dry wood.	Time that 10° (F.) of heat were maintained by combustion of 1 pound.	Percentage of value for fuel, Shellbark Hickory being 100.
										h.m.	
25	White Oak	Quercus alba	0.855	3,821	21.62	0.401	21.10	826	39	6.20	81
26	Shellbark White Oak	Quercus obtusiloba	0.775	3,464	21.50	0.437	22.99	745	32	6 20	74
27	Barren Scrub Oak	Quercus Catesbæi	0.747	3,339	23.17	0.392	20.63	774	38	6.30	73
28	Pin Oak	Quercus palustris	0.747	3,339	22.82	0.436	22.94	742	32	6.20	71
29	Scrub Black Oak	Quercus banisterii	0.728	3,254	23.80	0.387	20.36	774	38	6.30	71
30	Red Oak	Quercus rubra	0.728	3,254	22.43	0.400	21.05	630	30	6.20	69
31	Barren Oak	Quercus ferruginea	0.694	3,102	22.37	0.447	23.52	694	29	6.20	66
32	Rock Chestnut Oak	Quercus prinos monticola	0.678	3,030	20.86	0.436	22.94	632	28	6.00	61
33	Yellow Oak	Quercus prinos accuminata	0.653	2,919	21.60	0.294	15.52	631	41	6.10	60
34	Spanish Oak	Quercus fulcata	0.548	2,449	22.95	0.362	19.05	562	30	6.20	52
35	Persimmon	Diospyros Virginiana	0.711	3,178	23.44	0.469	24.68	745	30	6.30	69
36	Yellow Pine	Pinus mitis	0.551	2,463	23.75	0.333	17.52	585	33	6.30	54
37	Jersey Pine	Pinus inops	0.478	2,137	24:88	0.385	20.26	532	26	6.40	48
38	Pitch Pine	Pinus rigida	0.426	1,904	26.76	0.298	15.68	510	33	6.40	43
39	White Pine	Pinus strobus	0.418	1,868	24.35	0.293	15.42	455	30	6.40	42
40	Yellow Poplar	Liriodendron tulipifera	0.563	2,516	21.81	0.383	21.15	549	27	6.10	52
41	Lombardy Poplar	Populus dilatata	0.397	1,776	25.00	0.245	12.89	444	34	6.40	40
42	Sassafras	Sassafras officinale	0.618	2,762	22.58	0.427	22.47	627	28	6 20	59
43	Wild Service	Amelanchier Canadensis	0.887	3,964	22.62	0.594	31.26	897	29	6.20	84
44	Sycamore	Acer pseudo-platanus	0.535	2,391	23.60	0.374	19.68	564	29	6.30	52
45	Black Walnut	Juglans nigra	0.681	3,044	22.56	0.418	22.00	687	31	6.20	65
46	Whortleberry	Vacinium corymbosum	0.752	3,361	23.30	0.505	26.57	783	29	6.30	73

TABLE SHOWING THE PURPOSES FOR WHICH THE MORE IMPORTANT TREES MAY BE PLANTED.

Common names.	Recommended for—
Silver-leaf Maple	Shelter, ornament, fuel.
Sugar-maple, Black Maple	Sugar, ornament, fuel.
Box-elder, Ash-leaf Maple	Fuel, shelter, ornament.
Red Maple	Shelter, ornament, fuel.
Rock Maple, Sugar-maple	Sugar, ornament.
Balsam Fir	Shelter, balsam, ornament.
Douglas Spruce	Shelter, ornament, manufacture.
White Spuce	Shelter, ornament, manufacture.
Norway Spruce	Shelter, ornament, manufacture.
Black Spruce	Shelter, ornament.
Horse Chestnut	Ornament.
Yellow Birch	Manufacture, ornament, shelter.
Shell-bark Hickory	Manufacture, fuel, ornament, fruit.
Bitter-nut Hickory	Manufacture, fuel.
Black Cherry	Manufacture, ornament.
Chestnut	Manufacture, ornament, fruit.
White Cedar	Ornament, manufacture.
White Ash	Manufacture, fuel, ornament.
Blue Ash	Manufacture, fuel, ornament.
Green Ash	Manufacture, fuel, ornament.
Black Ash	Manufacture, fuel, ornament.
Honey Locust	Hedge, manufacture, fuel, ornament.
Black Locust	Manufacture, fuel, ornament.
Butter-nut, White Walnut	Manufacture, fruit.
Black Walnut	Manufacture, fruit.
Pecan-hickory	Manufacture, fruit.
Red Cedar	Manufacture, shelter, ornament.
European Larch	Manufacture, shelter, ornament.
American Larch	Manufacture, shelter, ornament.
White Pine	Manufacture, shelter, ornament.
Scotch Pine	Manufacture, shelter, ornament.
Austrian Pine	Manufacture, shelter, ornament.
White Poplar	Shelter, fuel, manufacture.
Sycamore	Manufacture, ornament.
Red Oak	Manufacture, ornament, fuel.
White Oak	Manufacture, tanbark, ornament, fuel.
Burr Oak	Manufacture, ornament, fuel.
Chestnut-leaf Oak	Manufacture, tanbark, (coppice) ornament, fuel.
Linden, Basswood	Ornament, honey, manufacture.
European Linden	Ornament, honey, manufacture.
White Elm, American Elm	Manufacture, fuel, shelter, ornament.
Slippery Elm, Red Elm	Manufacture, fuel, shelter, ornament, medicine.
Rock Elm	Manufacture, fuel, belts.
Tulip Tree	Ornament, manufacture.
White Willow	Shelter, charcoal.
Black Willow	Shelter.
Catalpa	Manufacture, ornament, fuel, shelter.
Cucumber Tree	Ornament, manufacture.

CONTENTS.

TREES AND TREE PLANTING,

WITH EXERCISES AND DIRECTIONS FOR THE

CELEBRATION OF ARBOR DAY.

PREPARED BY

JOHN B. PEASLEE,

SUPERINTENDENT CINCINNATI PUBLIC SCHOOLS,

WITH A PREFACE BY

WARREN HIGLEY.

OFFICERS

OF THE

OHIO STATE FORESTRY ASSOCIATION

FOR 1884.

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DR. FRANCIS PENTLAND,	HON. CHARLES REEMELIN.

PREFACE.

THE subject of this little pamphlet is one that is rapidly rising in favor with the business community and the political economists. From the attention that has been given it by the press, and the facts disseminated by societies like ours, the thoughtful, intelligent citizen who studies the causes of the decline in national resources—how countries once famous for their fertility of soil and salubrity of climate and dense population have become desolate wastes, unfitted for the habitation of man—how some countries have checked the rapid tendency to such desolation and ruin, and recovered their former prosperity—will see that the forests played the most important part in these causes; that their denudation was followed by the decline, and then the destruction of the national resources, while their replanting resulted in reclaiming, and in renewed production. The various and immediate uses to man of trees and their products have caused their rapid destruction, until the threatened dearth in this country is becoming alarming. This can be avoided only by convincing those who are most directly interested of the undeniable facts, and thereby inducing the people to better protect existing forests, and to take early steps to plant new ones for the benefit of themselves and of future generations.

In a country like ours, where the *people* own the land and where the farmer has to look to the products of the farm for his income, it is a question with him of *profit* as between the wood-lot and the cleared field, whether the wood shall remain to supply the fuel, the fence and necessary timber for home purposes, or whether it shall give place to the corn-field, the wheat-field, or the meadow. With good tillable soil, the *profit* is, no doubt, largely in favor of the open field, especially as compared with our native forests from which the most valuable trees have been culled, and only wood of an inferior quality left. But the result would be quite different with a forest planted and cared for according to the principles of forestry as practiced in Germany and France, as conclusively appears in the following pages. There is, however, scarcely a farm of a hundred acres in Ohio and the originally wooded States, but that from 20 to 25 per cent of its surface can be more profitably devoted to tree culture than to any thing else. In fact, there is much of the best farming country that is useless for crops, as the farmer knows, and yet is well adapted to the growth of trees. These comparatively useless tracts should be planted to the right kind of trees, and the whole farm thereby made productive, while the influence of such planting and nurture, in beautifying the landscape, in rendering the country more salubrious,

the climate more equable, the fruit crops surer, and the vegetable product larger, would greatly enhance the moneyed value of the land and render life far more enjoyable.

The importance of forestry has been recognized by the governments of Europe for more than a century past. Schools of forestry have been established, and its principles reduced to a science. These are the result of necessity. The widespread destruction of the forests so affected the climate and productions of the soil, and the wants and the manufacturing interests of the people, and the wealth and prosperity of the nation, that the governments were forced to legislate and prevent the threatened destruction which was found to surely follow the complete denudation of the forests. The most wholesome effects have resulted wherever a system of forestry has been introduced and followed. Unhealthy regions have been rendered salubrious; floods have been modified and partly controlled; crops have been rendered more certain; vast areas of waste-lands have been forested and rendered productive in wood and timber, whereby large revenues have been realized, and important interests subserved.

I know of no facts more convincing of the necessity for attention to forestry in this country than those found in our last census report, from which I take the following figures:

PARTIAL ESTIMATE OF THE CONSUMPTION OF FOREST PRODUCTS AS FUEL IN THE UNITED STATES DURING THE CENSUS YEAR ENDING MAY 31, 1880.

Number of persons using wood for domestic fuel, ... 32,375,074

ESTIMATED CONSUMPTION OF WOOD FOR DOMESTIC PURPOSES.

Number of cords for home use, . . .	140,537,439	Value,	$306,950,040
By railroads, ...	1,971,813	"	5,126,714
By steamboats, ...	787,862	"	1,812,083
In mining and amalgamating the precious metals, ...	358,074	"	2,874,593
In other mining operations, ...	266,771	"	673,692
In the manufacture of brick and tile, . . .	1,157,522	"	3,978,331
In the manufacture of salt, ...	540,448	"	121,681
In the manufacture of wool, ...	158,208	"	425,239
Total, ...	145,778,137	"	$321,962,373

CONSUMPTION OF CHARCOAL.

In the twenty largest cities—Bushels, . .	4,319,194	Value,	$521,316
In manufacture of iron, " . .	69,592,091	"	4,726,114
In the production of precious metals, ... " . .	97,687	"	29,306
Total, ...	74,008,972	"	$5,276,736

In this table Ohio is estimated to consume for domestic purposes, exclusive of what is used in manufactures, 8,191,543 cords of wood, with an estimated value of $16,492,574. Allowing an average yield of forty cords to the acre, it requires 204,788 acres of forest to supply the demand in this State one year for fuel alone.

The following are some of the statistics of the lumbering industry of the United States for the year ending May 31, 1880:

Capital employed,	$181,186,122
Number of hands employed—Males,	141,564
Females,	425
Children and youth,	5,967
Value of logs,	$139,836,869
Wages paid during the year,	31,845,974
Feet of lumber (board measure) produced,	18,091,356,000
Number of laths,	1,761,788,000
Number of shingles,	5,555,046,000
Number of staves,	1,248,226,000
Number of headings,	146,523,000
Feet of spool and bobbin stock (board measure),	34,076,000
Value of all other products,	$2,682,668
Total value of all products,	$233,367,729

The lumbering interest of Ohio for the year ending May 31, 1880, is estimated as follows:

Capital invested, $7,944,412; number of hands employed, 15,277; value of logs, $8,603,127; wages paid during the year, $1,708,300; feet of lumber (board measure), 910,832.000; number of laths, 50,625,000; number of shingles, 24,875,000; number of staves, 214,245,000; number of sets of headings, 25,779,000; value of all the lumber products of Ohio (estimated), $13,864,460. This, added to the estimated value of wood used for domestic purposes—to wit, $8,191,543—gives a total value of the product of the State for the census year of 1880, $22,056,003; and this consumption is rapidly increasing through the demands of our growing population.

A comparison of the census returns of 1870 and 1880 shows a decrease of wood lands in the belt including latitude 37 degrees to 40 degrees, through which runs the Ohio River, extending westward across the Mississippi River, of from 34 to 26 per cent, being greatest in Ohio and Indiana.

At the meeting of the Forestry Congress in Cincinnati, April, 1882, Dr. Franklin B. Hough, then chief of the Forestry Department, read a valuable paper on "Tree Planting by Railroad Companies," in which he says:

"We have in the United States about 100,000 miles of railroads. The number of ties to a mile range from 2,200 to 3,000, and in some cases as high as 3,500. If we assume an average of 2,500 to the mile, we have a quarter of a billion in use. They average eight feet in length, and about seven inches deep and eight inches wide, giving the contents of almost three cubic feet apiece, or in all 6,000,000 of cords. If piled cord-fashion, they would form a pile four feet high, eight feet wide, and 4,575 miles long. Placed end to end, they would span the earth fifteen times at the equator, or in one line would reach miles beyond the moon. Taking the average life of a tie at from five to eight years, and we shall need from 30,000,000 to 50,000,000 new ties a year for maintaining the present railroads of the country in constant use. Allowing 500 ties to the acre, we shall need to cut from 60,000 to 100,000 acres every year to meet this demand. To grow trees to the size necessary for ties will require an average of about thirty years, and we shall need, to keep up this supply, nearly 3,000,000 acres of forests, or about

2,500 acres for every hundred miles of road. This is equivalent to a belt of woodland twelve and one-half rods wide along the road, or about three times the right of way."

In a recent article on the condition of our forests and their effect upon the floods of 1883 and 1884, Dr. Hough says:

"Let us now see how these forest supplies stand, and how the future promises, with regard to their continuance in the United States. We have as our only data the census of different periods; and the returns of 1880 show that, of our States and Territories, 9 had reduced their woodlands to below 10 per cent; 5, to between 10 and 20 per cent; 8, to from 20 to 30 per cent; 11, to from 30 to 40 per cent; and 4, to from 40 to 50 per cent, when this census was taken. In 10 States of the South and South-west the proportion was 50 per cent or more, and in the whole United States the woodlands occupied 35 per cent of the whole reported area.

"In Ohio the returns made by assessors (which appear to be very reliable) show the tendencies of clearing in a very strong light, and taking three periods for comparison we get the following results:

	Acres of woodland.	Decrease from former period.	Percentage of woodland to total area.
1853	13,991,228	. . . .	55.27
1870	9,749,333	4,241,895	38.51
1881	4,708,247	5,041,086	22.71

"In 1881, 601,136 acres, or about 3 per cent (not included in the woodlands), were lying waste.

"The amount of clearing, from 1870 to 1881, is shown to have been 5,041,083 acres, and at this rate it becomes an easy question to solve as to how long the remaining 4,708,247 acres will last. We have not figures to prove that these rates of clearing have been going on in the other states bordering upon the Ohio river, or supplying it by their drainage; but the connection between this denudation and the floods of the present and of recent years can not be mistaken. Last year the damages were estimated at $60,000,000. There may have been less damage done this year (although the flood was five feet higher), because there was less property to destroy. In a letter from a friend in Marietta we are told that four hundred houses floated past that place in the recent flood, which probably took off many that were not reached by the waters before.

"Nine years ago a million of dollars or more of property was destroyed at Rochester by a flood unquestionably occasioned primarily by the extensive clearings in recent years around the head waters of the Genesee River. The heavy rains and warm winds, which rapidly melted the snows and supplied the floods on that occasion, could not have had so immediate an effect in a wooded country.

"Passing from Winter floods, we find the other extreme in Summer droughts, which in recent years have become more frequent and distressing than were known in former years, and both may be traced unerringly to the same cause—the clearing-off of the woodlands which formerly tended to equalize these extremes and maintain a more uniform flow of waters throughout the year."

THE OHIO STATE FORESTRY ASSOCIATION.

THE origin of the State Forestry Association, together with a brief history of the popular movement that led to its organization, may be of interest in this place.

In November, 1881, a public reception was given by the citizens of Cincinnati to the von Steubens, while on their visit through the country, after having taken part in the centennial celebration of the

battle of Yorktown. Among them was Baron Richard von Steuben, the Royal Chief Forester of the German Empire, who made a most favorable impression upon those with whom he came in contact and deeply interested them by his talks on forestry.

In the early part of January following, a few of the gentlemen * who had been most active in this reception, met in my office and discussed, among other things, the duties of the Royal Chief Forester of Germany and the subject of forestry in general. The more we discussed the greater the interest became, and the more apparent it was that a popular movement should be inaugurated to bring the subject to the earnest consideration of the people. Before we separated it was resolved to call a meeting of some of the public-spirited citizens and put the ball in motion. Accordingly a committee was organized, and for the next three months the press of the country laid before the people the subject of forestry in its various important aspects.

The work of the committee culminated in a three days' meeting at Music Hall, April 25th, 26th, and 27th, at which most of the distinguished foresters of this country and Canada were present and read papers before the scientific department. The excellent programme for this meeting at Music Hall was prepared principally by Dr. John A. Warder, and Prof Adolph Leué. Governor Foster made the address of welcome. The public schools were dismissed on the 26th and 27th to enable the teachers and pupils to take part in the celebration of tree-planting in the public parks. The 27th had been appointed as Arbor Day by proclamation of the governor. Extensive preparations had been made for its appropriate celebration in Eden Park. The city was in holiday attire. The soldiery and organized companies of citizens formed an immense procession under command of Col. S. A. Whitfield and marched to the park, where the command was turned over to Col. A. E. Jones, the officer in charge. The school children were under the charge of Superintendent Peaslee. Fifty thousand citizens covered the grassy slopes and crowning ridges, those assigned to the work of tree-planting taking their respective places. At the firing of the signal gun, "Presidents' Grove," "Pioneers' Grove," "Battle Grove," "Citizens' Memorial Grove," and "Authors' Grove," were planted and dedicated with loving hands and appropriate ceremonies. Addresses were made by ex-Governor Noyes, Dr. Loring, Cassius M. Clay, Gen. Durbin Ward, and others. No sight more beautiful, no ceremonies more touching, had ever been witnessed in Cincinnati. An important lesson in forestry had, indeed, been brought home to the hearts of the people, and a crown of success was awarded the American Forestry Congress. This was the first Arbor Day celebration in Ohio. And thus closed the first session of the American Forestry Congress, which embraces in its scope the United States and Canadas.

In January, 1883, the Ohio State Forestry Association, the out-

* NOTE.—The gentlemen present at this conference were Col. W. L. De Beck, Rev. Dr. Max Lilienthal, Supt. John B. Peaslee, Hon. John Simpkinson, the first president of the Association, Col. A. E. Jones, and Hon. Emil Rothe.

growth of the American Forestry Congress, was organized. The organizers were Dr. John A. Warder, Prof. Adolph Leué, Col. A. E. Jones, Hon. John Simpkinson, Supt. John B. Peaslee, Gen. Durbin Ward, Hon. Emil Rothe, Hon. Leopold Burckhardt, D. D. Thompson, Prof. R. B. Warder, Prof. Adolph Strauch, Dr. A. D. Birchard, Hon. Charles Reemelin, Prof. W. H. Venable, Dr. W. W. Dawson, John H. McMakin, Esq., myself, and perhaps a few others. The work of the previous year was largely repeated. A convention was held in April, at which many valuable papers were read, some of which were printed in full in the daily papers.

By authority of a joint resolution adopted by both branches of our State Legislature, Governor Foster issued his proclamation, appointing the fourth Friday in April as Arbor Day, which was the last day of our convention. Accordingly, our association had made extensive preparations for its celebration in Eden Park by the citizens and by the public schools.

I can give no better idea of this second celebration of Arbor Day in Cincinnati than by quoting from an article that appeared the following morning in one of our leading journals:

"The east ridge of the park was thronged with the associations planting tablets to the memories of the Presidents of the United States, the heroes of Valley Forge, and the pioneers of Cincinnati in their respective groves, while the northern projecting slope of the ridge was occupied by fully seventeen thousand school children in honoring 'Authors' Grove.' Viewed from the summit of the ridge immediately west, the sight was one of the most animating ever brought before the eyes of Cincinnatians. The entire ridge, nearly a third of a mile in length, was occupied by those persons taking part in the first-named ceremonies, while the slope designated was occupied by a dense mass of gayly dressed children in active motion over a surface of about five acres, and whose voices, wafted across the deep hollow to the western ridge, sounded like the chattering from a grove full of happy birds. The eastern slope of the west ridge was occupied by three thousand or four thousand spectators, who, reclining on the green Spring sod of the grassy slopes, quietly surveyed the scene from a distance. In all, there were over twenty thousand persons present. Before the exercises commenced a number of interesting photographic views were taken of the immense crowd, and others were taken after the children of the various schools had formed their circles around their respective trees along the slope of Authors' Grove, and they formed a picture of twenty-five or thirty circles of humanity around the young trees, with the populace massed between. Over in the center of the east ridge was the speakers' stand, with a tall staff bearing the national colors rising from the center, while smaller flags marked the trees dedicated to each author. The trees and tablets in all the various groves had been previously planted, so that yesterday was but a dedication day of the planting. The grove to the honor of Cincinnati pioneers had been planted by the association, and yesterday the tablet was laid to their memory. All the tablets were of uniform size and construction, each being of sandstone, twenty-four by thirty-six inches surface, and eleven inches depth. That for the Cincinnati pioneers contained at the upper center a figure of the primitive log-cabin, and the following inscription, 'Planted and Dedicated to the Memory of the Pioneers of Cincinnati by the Forestry Society.' Below were cut the names of the pioneers.

"'Presidents' Grove' bore a tablet with the following inscription: 'Presidents' Grove, Planted and Dedicated to the Memory of the Presidents of the United States, by the Forestry Society, 1882, Cincinnati, April 27th.' Then followed the names of all the twenty-one Presidents, down to President Arthur.

"'Centennial Grove' was planted in 1876 by Colonel A. E. Jones, from trees brought from Valley Forge. The tablet he had laid yesterday was dedicated to the heroes who served with Washington at Valley Forge. Following is the inscription: Eagle bearing the scroll 'Centennial Grove. Dedicated to the memory of 1776, and the patriots who suffered with Washington at Valley Forge, brought from that historic ground and planted by A. E. Jones, April 27, 1876.' Then followed the names Washington, Knox, Lafayette, Greene, Hamilton, Gates, Wayne, Putnam, H. Lee, Steuben, Weldin, Muhlenburg, Sullivan, Stark, Warren, McIntosh, Potter, Maxwell, Woodward, Patterson, Allen, De Kalb, Kosciusko, Marion, C. Lee, Glover, Poor, Larned, Scott, Pulaski, Sumter, Lincoln, Morgan, Smallwood, Eberhardt.

"Place was left upon each tablet for additional names. The Forestry Association planted a pin-oak tree to the memory of the late Adolph Strauch, superintendent of Spring Grove Cemetery. This was his favorite tree, and a year ago he expressed the hope that if any tree should ever be planted to his memory, it should be a pin-oak. It was appropriately draped in mourning, and labeled. An imported horse-chestnut was planted to the memory of Rev. Dr. Lilienthal by the German Pioneer Association. Both occupy prominent positions on the summit and center of the east ridge.

"At eleven o'clock the school exercises commenced at 'Authors' Grove.' These exercises were outlined by Superintendent Peaslee in the assignment of authors to the respective schools, and the programmes were filled out by the principals. The trees having previously been planted, small granite tablets, about eight inches square, bearing the name of the author honored and the date of the ceremony, were sunk, in most cases uniformly with the surface of the sod, in the immediate vicinity of the tree. Thus the exercises were dedicatory only.

"Following was the order of the school exercises, each of which included a sketch of the author designated, appropriate songs, and the recitation of selections from the author's works."

Here follows a detailed account of the part each school took in the exercises.

These were the first *memorial* groves ever planted in America—the first public planting of trees in honor of the memory of authors, statesmen, soldiers, pioneers, and other distinguished citizens.

Superintendent Peaslee, as chairman of the Arbor Day Committee, prepared a circular addressed to trustees, superintendents, and teachers of Ohio, requesting them to celebrate Arbor Day after the *Cincinnati plan*, which was outlined in the circular. This document was sent to all parts of Ohio, and to other States, and I am happy to know that in many places in Ohio and in adjoining States, tree-planting was celebrated according to this plan. The entire school system of West Virginia, under the inspiration of her enterprising State superintendent, B. L. Butcher, responded to this sentiment, and celebrated tree-planting after the manner set forth in our circular. One of the leading journals of England has lately recommended the introduction of the Cincinnati plan of tree-planting celebrations into the public schools of Great Britain.

There is a German proverb which says "what you would have appear in the nation's life you must introduce into the public schools."

It is gratifying to know that the efforts made in Cincinnati in behalf of forestry are duly appreciated abroad by men distinguished for their attainments in forestral science. Prof. Adolph Leue, our secretary, a scientific forester by education, sent several packages (of 100 trees each), of the *Catalpa speciosa* to different parts of Europe

accompanied with requests to plant them on "Arbor Day," April 27, 1882. These requests were complied with. Prof. Dr. F. Judeich, the celebrated director of the "Royal Forest Academy," of Tharandt, Saxony—the most renowned forest academy in the world—informed Prof. Leue that the trees sent by him were planted by the academy near the famous grove of beech known as "Tharandt's Heilige Hullen," and that the grove they form is dedicated to "Cincinnati Arbor Day," and is called the "Cincinnati Arbor Grove." The *Catalpa speciosa* is a purely American tree, described and named by Dr. John A. Warder, and this is its first introduction into Europe.

NECROLOGY.

Rev. MAX LILIENTHAL, D. D., the distinguished and eloquent rabbi of the Mound Street Temple, of this city, was among the first of our zealous workers in the promotion of the interests of forestry. He was a wise counselor, a profound scholar, an earnest leader, a devoted friend. His last public utterances were made before the committee which was then arranging for the organization of the Forestry Congress. He died suddenly, in the Spring of 1882, leaving a vacancy in the list of our officers ever to be mourned.

Prof. ADOLPH STRAUCH, the superintendent of Spring Grove Cemetery, and the first man who introduced the principles of landscape gardening, in the management of cemeteries, was also one of our most active officers. Recognized as one of the first arboriculturists in America, and the man to whom is the credit of giving to Cincinnati her renown for beautiful suburbs, with landscapes as lovely as a dream, he was generally beloved. He died in April, 1883, during the session of our Forestry Association.

DR. JOHN A. WARDER, the honorary president of our association, died at his beautiful home, at North Bend, Ohio, in July, 1883. His love for nature seems to have been born in him. His early surroundings and associations were powerful allies in his education as a naturalist. He read and studied and mastered the Book of Nature in its varied teachings as but few have mastered it. A seed, a bud, a leaf, a plant, a branch, a tree, a shell, a rock, attracted his notice and elicited investigation. He was a veritable student of Nature, and his life among men was as lovingly beautiful as it was among his plants and his trees.

His work in the great West for the encouragement of tree-planting, and in other parts of the country, and his varied and extensive writings on subjects pertaining to forestry, are well known in this country and in Europe. He is justly called the Father of American forestry.

Kind, generous, loving, hopeful, enthusiastic, full of accurate knowledge which he was ever ready to impart, teachable in spirit and teaching in life, he elevated and blessed his race.

The forests will sing his requiem and future generations will call him blessed.

WARREN HIGLEY,

President of Ohio State Forestry Association.

INTRODUCTION.

THE time has come when the people of Ohio must wake up to the importance of preserving our forests and of planting trees, or our State will suffer the terrible consequences of this neglect before another half century has passed away. Hon. Emil Rothe, who has given the subject much study, in speaking of Ohio before the American Forestry Congress at Cincinnati in 1882, said: "Let the hills be deprived of the rest of the protection which the forests afford, and half the area of our State will be sterile in less than fifty years." "The wealth, beauty, fertility, and healthfulness of the country," as Whittier justly says, "largely depend upon the conservation of our forests and the planting of trees." How can these truths be impressed most effectively upon the minds of our people? In the first place, forestry associations should be organized in every city, town, village, and country school district in the State, whose object shall be to plant trees along streets, by the road-sides, in parks and commons, around public buildings, in waste places; to distribute information in regard to trees and forests among the people, and to encourage tree-planting in every way possible. These associations, in conjunction with the schools, should hold tree-planting celebrations from year to year, but where such associations are not formed, the schools should conduct the exercises. The youth of our State must be instructed in the value and utility of forests—their influence upon climate, soil, productions, etc.—correct sentiment in regard to trees must be implanted in them if the best interests of the State in regard to forestry are to be subserved; and the most impressive and attractive means of imparting the instruction, and of interesting the pupils in the subject, is through the celebration of tree-planting. It is also the surest and best way of calling the attention of the people at large to it. The object of the celebration is to instill into the minds of children and older citizens correct sentiments in regard to trees, and to store their minds with information relating to forestry, and to the distinguished individuals in whose honor or memory each tree, or group, is planted, for we would have all the trees around which the celebrations take place dedicated to great authors, statesmen, soldiers—in brief, to famous men and women, whose lives have reflected honor upon our country; to the pioneers and distinguished citizens of each township, village, or city, as the case may be, and thus "make *trees*," as Holmes says, "monuments of history and character."

In every place where sufficient grounds can be obtained, either in public parks or elsewhere, we would have memorial groves planted, and the "Arbor Day Celebrations" take place in them. Let there be a "Citizens' Memorial Grove," in which trees shall be planted from year to year by loving hands of the relatives and friends of those who have died; let there be a "Pioneers' Grove," in which all citizens,

young and old, shall annually join in paying just tribute to the memory of those who endured the hardships and privations of a pioneer life.

"They vanish from us, one by one,
In death's unlighted realm to sleep;
And O! degenerate is the son
Who would not some memorial keep."

Let there be an "Authors' Grove," in which the school children shall honor, by living monuments, the great men and women in literature, so that while they learn to love and reverence trees they will, at the same time, become interested in the lives and writings of distinguished and worthy authors. Let there be a Soldiers' Grove, devoted to the memory of our patriotic dead. Yes,

Plant beautiful trees in honor of those
Whose memory you revere,
And more beautiful still they'll become
With each revolving year.

And what monuments the trees, the monarchs of the vegetable world, become! They are more durable than marble itself.* Their grandeur will challenge the admiration of the beholder when the coeval marble monument at their base will lie in ruins, defaced by age and crumbling into dust. Well may the great historian, Benson J. Lossing, ask, "What conqueror in any part of 'life's broad field of battle' could desire a more beautiful, a more noble, a more patriotic monument than a tree, planted by pure and joyous children, as a memorial of his achievements? What earnest, honest worker, with hand and brain for the benefit of his fellowmen, could desire a more pleasing recognition of his usefulness than such a monument, a symbol of his or her own productions, ever growing, ever blooming, and ever bearing wholesome fruit?"

Should the annual celebration of tree-planting, the preparation for which affords ample opportunity for imparting all needful information in regard to trees and forestry, become general in our State, the time would not be far distant when such a public sentiment would be formed as would lead to the beautifying by trees of every city, town, and village in Ohio, as well as public highways, church and school grounds, and the homes of the people in the country. In truth, within the next twenty-five years thereafter the general aspect of many parts of the State would be changed as has been that of Connecticut within the last few years through the instrumentality of her schools under the leadership of Hon. B. G. Northrop, and of her "Improvement Societies," which have been organized through his efforts. Pastor Oberlin, after whom Oberlin College, of this State, is named, required each boy and girl, before he would administer the ordinance of confirmation, to bring a certificate that he or she had planted two trees. If but the youth of Ohio could be led to plant their two trees each, how by the

*NOTE.—The natural age of the oak is from 1,500 to 2,000 years; of the elm from 350 to 500 years; of the cypress, 350 years; of the larch, 600 years; of the yew tree, 2,500 to 3,000 years; of the maple from 600 to 800 years; of the cedar, 800 years; of the linden, 1,200 years. There are trees now standing that are supposed to be over 5,000 years old.

children alone could our great State be enriched and beautified within the next fifty years.

Again, the trees which the children plant, or which they assist in dedicating, will become dearer to them as year after year rolls on. As the trees grow, and their branches expand in beauty, so will the love for them increase in the hearts of those by whom they were planted or dedicated, and long before the children reach old age they will almost venerate these green and living memorials of youthful and happy days; and as those who have loved and cared for pets will ever be the friends of our dumb animals, so will they ever be the friends of our forest trees. From the individual to the general, is the law of our nature. Show us a man who in childhood had a pet, and we 'll show you a lover of animals. Show us a person who in youth planted a tree that has lived and flourished, and we 'll show you a friend of trees and of forest culture.

ARBOR DAY CELEBRATION BY THE SCHOOLS.

We suggest that the exercises consist of reading, by the pupils, compositions or essays on the importance and usefulness of forests; of reciting, individually and in concert, selections on trees from various authors; of giving extracts from, and sketches of, the life and writings of the particular author in whose honor or memory each tree or group is planted; of singing; of the ceremony of throwing the soil, each pupil in turn, about the trees; and of appropriate talks by trustees, teachers, and others.

It is intended to have the exercises indicated above take place while the pupils of each class, room, or school, as the case may be, are arranged around their respective trees or groups. At the conclusion of this part of the programme, let all the pupils come together and sing our national and other appropriate songs, and listen to short addresses by speakers selected for the occasion. All the exercises should not occupy more than two hours, and at the expiration of that time the children should be permitted to enjoy their holiday (within proper limits, of course), after their own manner, on the green sod. Thus, "with the ceremony of a celebration, and with the attraction and pleasures to the young minds of a holiday, the exercises and what they symbolize will be deeply stamped upon the memory of the school children, and the entire effect upon them must prove to be of the most important and satisfactory character."

In order to indicate more fully the character and scope of the Arbor Day celebrations, we will here give a brief description of the celebrations held by the public schools of Cincinnati in Eden Park. For a fuller detail of the same we refer you to the last two annual reports of the schools.

About six acres were set apart in the park for a grove, now known as "Authors' Grove." Selections on trees and forestry from various authors were sent to the several schools to be memorized by the pupils; also information concerning historic trees of our country, and many facts of history giving the effects upon climate, soil, production, etc., both of the destruction and the removal of forests were given to the scholars. These formed the basis of compositions in the upper grades.

In addition to the above, the teachers gave sketches of the lives of their respective authors, and the pupils learned selections from their writings. In some of the schools the boys were organized into companies, under the name of Forestry Cadets, or the "Emerson Forestry Cadets" of Hughes High School, the "Longfellow Forestry Cadets" of the Eleventh District School, the "Holmes Forestry Cadets" of the Twenty-second District School; the girls and boys not organized were called Foresters, as the "Franklin Foresters" of the Tenth District School, the "Whittier Foresters" of the Twenty-sixth District School, and so on.

That the part taken by the pupils in the actual planting of the trees may not be misunderstood, I will state that experienced tree-planters did most of the work of setting out the trees previous to Arbor Day, and that the pupils finished the setting by filling around each tree soil left in heaps for this purpose.

On Arbor Day, Authors' Grove was distinguished from the others ("Pioneers' Grove," "Battle Grove," "Presidents' Grove," "Citizens' Memorial Grove," for the celebration of tree-planting was going on at the same time in each of these groves), by a large blue flag, placed near the center of the grove, and by small flags of the same color placed around the grove. At a given signal the pupils, upwards of seven thousand in number (at the celebration last year there were more than seventeen thousand present), arranged themselves, each school around its special author's tree or group, and the exercises indicated above began.

CELEBRATION EXERCISES.

In order to furnish information to composition writers and to speakers, Part First of this pamphlet contains lessons from history and other important facts. We earnestly request trustees, superintendents, and teachers to familiarize the older pupils under their charge with these facts, whether their schools celebrate tree-planting or not.

Part Second contains extracts on trees from various authors, for concert and individual recitation. It is not expected that they will all be recited at one celebration, but it is thought best to give a large variety from which to select.

It was our intention at first to have this pamphlet consist of three parts; Part Third to contain sketches of the lives of a number of our great authors, and selections from their writings, but, after careful consideration, it has been decided not to add this, for two reasons. First, because it would make the pamphlet too large, and, second, because sketches of the lives of our authors are found in our school readers, and beautiful selections from their writings can be made by the teachers with little difficulty. Of course the selections for this part of the programme need not be on trees or forestry.

JOHN B. PEASLEE,

Chairman Committee on Arbor Day Exercises.

PART FIRST.

LESSONS FROM HISTORY,

AND OTHER FACTS.

PALESTINE.

AT the time when Joshua conquered the Promised Land, milk and honey were flowing into Canaan; that is, it was a country of wonderful fertility, blessed with a delightful climate. Both ranges of the Lebanon and its Spur Mountains were then densly covered with forests, in which the famous cedar predominated, that stately tree so masterly and poetically described by the psalmist and the prophets. The large and continually increasing population of Palestine enjoyed comfort and abundance during centuries. But the gradual devastation of the forests, which was finally completed by the Venetians and the Genoese, brought about a general deterioration of the country. The hills of Galilee, once the rich pasturing grounds for large herds of cattle, are now sterile knobs. The Jordan became an insignificant stream, and the several beautiful smaller rivers, mentioned in the Bible, now appear as stony runs, leading off the snow and rainwater, but being completely dry during the greater part of the year. Some few valleys, in which the fertile soil washed down from the hills, was deposited, have retained their old fertility, but the few cedar trees remaining as a landmark around the Maronite convent on the rocky and barren Lebanon, look lonely and mournfully upon an arid and desolate country, not fit to sustain one-sixth of such a population as it contained at the time of Solomon.

EMIL ROTHE.

GERMANY.

The progress made by Germany in tree-planting is but a part of her general progress. The credit is given to the great Frederick; it was part of the national policy of his day which raised Prussia from a small power to a great one, and to the energetic continuance of that policy, Germany owes Sadowa and Sedan. By this forethought, vast armies have been maintained, where once the sandy deserts would not nourish a flock of goats, and successive regiments of hardy soldiers have poured forth from the fertile soil where, two hundred years ago, the rugged *débris* of winter torrents, the thorn and the thistle, overspread a thirsty and impoverished land.

R. W. PHIPPS.*

* NOTE.—The articles credited to Mr. R. W. Phipps, of Toronto, Canada, were taken from his report to the Canadian Government; those credited to Hon. Emil Rothe, from the Proceedings of the American Forestry Congress, published in the report of the Toronto Fruit Growers' Association. Both of these reports are exceedingly valuable. J. B. P.

PROVINCE OF DÜBEN, SAXONY.

In the Prussian province of Saxony, the town of Düben celebrates an annual festival. The forests surrounding it had been recklessly cleared, and the sand banks which lay to the north-east began at once to move. Long tracts of corn land were converted into a sandy waste. The waves of gritty particles began to overleap the hedges and overflow the gardens under the walls of the town. Vegetables became scarce, pasture for cattle rare, and the most serious results were feared, when the forests of the district offered to arrest the desolating invasion. Fifty years have elapsed since then. Now, rich woods of acacias, birch, and pine wave over the sandy hills, and with their fine network of rootlets, hold the restless sand in its place and compel it to quiescence. Every year the citizens of Düben turn out with music and banners, into the woods, and celebrate with great jubilation the salvation of their town. S. BARING GOULD.

FRANCE.

In France the aristocrats had preserved the forests. But when Jacques Bonhomme had overthrown their tyranny he proceeded to destroy the groves and forests, and in a short time he succeeded in almost staying crop growth in the fields adjacent. Wiser councils now prevail; experience has borne its fruits, and the French forests, particularly near the sea, bear witness how rapidly Providence assists a liberal, how sternly she repays a greedy and grasping, cultivator.

PHIPPS.

SPAIN.

Under the reign of the Moorish caliphs the Iberian peninsula resembled a vast garden, yielding grain and fruit, of every known variety, in the most perfect quality, and in endless abundance, and thickly populated by a highly cultivated people. But then the sierras and mountain slopes were covered with a luxuriant growth of timber, which was afterwards wantonly destroyed under the rule of the kings. Large herds of half-wild goats and sheep prevented the spontaneous growth of trees on the neglected lands. Now nearly all the plateau-lands of Spain, being fully one-third of the entire area, are desert-like and unfit for agriculture, because of the scarcity of rain and the want of water. Another one-third of the territory is covered with worthless shrubs and thorn-bushes, and affords a scanty pasture for the merino sheep, the number of which is decreasing from year to year. The once delicious climate has become changeable and rough, since there are no more forests to break the power of the scorching Salano and the cold Galego wind. The average depth of the fine rivers that cross Spain in all directions has greatly diminished. The government, well aware of the causes of the deterioration of the soil and climate, has lately made earnest efforts, partly to replant the old forest grounds, but has met with little success, it being very difficult to make trees grow on former timber land, which has been lying waste for a longer time. It will take a full century's time and necessitate an immense outlay of money to restock Spain with sufficient timber.

ROTHE.

Spain is very deficient in woodland. The evils of denudation are perhaps nowhere more signally exemplified than in Spain. Rentzsh goes so far as to ascribe the political decadence of Spain wholly to the destruction of the forests. A school of forestry has been lately established in Escorial, and good results from the training there may be hoped for.—*Encyclopædia Britannica.*

THE EASTERN COAST OF THE ADRIATIC SEA.

On the entire eastern coast of the Adriatic Sea, in Dalmatia, Herzegovina, and Montenegro, the same evil consequences of the devastation of the natural forests are clearly perceptible. These coast lands were very fertile until the Romans, having used up their own timber, took it from the other side of the Adriatic, and until millions of Illyric trees were converted into pillars and rammed into the lagunas to make foundations for the houses, palaces, and churches of Venice. What was left by the lumbermen was destroyed by the camp-fires of careless herdsmen, and here also the goats did their pernicious work in preventing spontaneous growth. The long mountain range running along the coast, which was yet well timbered in the time of the great Constantine, is now destitute of all soil; the naked lime-roads, reflecting the hot rays of the sun, warn the stranger not to enter the sterile and inhospitable country, hardly worth the loss of human life and treasure which the subjection of its unruly inhabitants now costs the house of Hapsburg. ROTHE.

SICILY.

Let us look at Sicily, once the great grain reservoir for Rome. Since the island of plenty was despoiled of its forests, it gradually lost its fertility and the mildness of its climate. The ruins of proud and opulent Syracuse lay in a desert, covered by sand, which the hot sirocco carried over the Mediterranean Sea from Africa. A few isolated, well-watered, and carefully cultivated districts of very limited extension, is all that is left to remind the tourist of the by-gone glory of Sicily. ROTHE.

PYRENEES MOUNTAINS.

The desolation of mountain regions by the clearing of forests is strikingly illustrated in the Pyrenees. Formerly the plains were cultivated, and inundations were much less frequent and less destructive than nowadays. As roads came to be opened the profit from sheep and cattle became greater, and the clearing of forests was begun to make room for pasturage and, to some extent, for timber, until by degrees the slopes of the mountains were denuded, and the rains, having nothing to hinder, began to form eroding torrents, the south slopes suffering most, because first cleared and directly exposed to the sun's heat. The extremes of flood and drouth became excessive, and extensive tracts have been ruined for present occupation from this source. PHIPPS.

ITALY.

When the Apennine and Sabinian Mountain range and its slopes were covered with its natural growth of trees, the now detested Roman Campagnas, which constitute the largest part of the Pontine swamps, were a beautiful section of country. They were then adorned with sumptuous Summer residences, villas, parks, flower and fruit gardens of the Roman aristocrats. After the destruction of the forests, the whole region became unhealthy, and almost absolutely uninhabitable on account of the malarious gases emanating from the soil. Formerly, these were absorbed by the leaves of numerous trees; now they fill the air and infect even the very heart of St. Peter's eternal city. ROTHE.

WITHIN a few years a portion of these swamps have been planted with eucalyptus trees, and they have had a wonderful effect on the healthfulness of the atmosphere, and people now reside in these parts during the Summer, where but a short time ago it was impossible to live. The eucalyptus tree is now being introduced into the everglades of Florida in order to purify the air in these unhealthy regions of the State. J. B. P.

ISLAND OF ASCENSION.

The Island of Ascension furnishes another remarkable instance. This island, some seven and a half miles long and six wide, was entirely barren when first occupied in 1815, and so destitute of water that supplies were brought from England and the Cape of Good Hope. Means have since been taken to plant trees and to introduce agriculture on the island, though not to any great extent. The effect has been remarkable. The island grows forty kinds of trees where but one grew in 1843, owing to want of water. The water supply is excellent, and the garrison and ships visiting the Island are supplied in abundance with vegetables of various kinds. PHIPPS.

CEYLON.

In his report to the Earl of Kimberly, Dr. J. D. Hooker, of the Royal Kew Gardens, says: "The presence of forests plays a most important part in storing the rainfall and yielding up gradually to the streams a continuous supply of water, a thing, I need hardly say, in a hot country of primary importance. Moreover, the rain is retained by forests on the surface of the ground; it gradually permeates to the subsoil, and so feeds the underground water-bearing strata upon which springs and wells must eventually depend. If the forest is indiscriminately removed the rain runs off as it falls, and washes away the superficial and fertile soil with it. The mischief already done in Mauritius and various West India Islands is so widely spread (being in some, indeed, irreparable), that I venture to press upon your lordship my own opinion as to the urgency of active steps being taken in the case of an island so beautiful and at present so fertile as Ceylon. I have lately received an account of the deterioration of the climate of some of the Leeward Islands, which affords a melancholy confirma-

tion of what I have urged above. The contrast between neighboring islands similarly situated is most striking. The sad change which has befallen the smaller ones is due to human agency alone. It is reported of these that in former times they were clothed with dense forests, and their older inhabitants remembered when the rains were abundant and the hills and all uncultivated places were shaded by extensive groves. The removal of the trees is the cause of the present evil. The opening of the soil to the vertical sun rapidly dries up the moisture. Without shade upon the surface, the water is rapidly exhaled, and springs and streams are dried up."

ST. HELENA.

The Island of St. Helena, the well-known scene of Napoleon's banishment, furnishes a remarkable illustration of the connection that exists between forests and rainfall. When first discovered, in 1502, it had heavy forests. The introduction of goats, and other causes, destroyed these woodlands, until the island was almost denuded. The consequences were that in the records of the last century we find accounts of repeated and almost periodical visitations of very severe drought, occasioning various losses to cattle and crop efforts. Towards the end of the last century, however, the governor saw the need of strenuous efforts. Gardeners were sent for, and trees from all parts of the world were planted, without regard to their character. The "Pinas Pinaster" was sown very extensively, and several plantations of this still exist. The consequences of this were discovered a few years ago as follows: "For many years past, since the general growth of our trees, we have been preserved from the scourge, and droughts such as were formerly recorded are now altogether unknown. Our fall of rain is now equal to that of England, and is spread almost evenly over the year." PHIPPS.

ISLAND OF SANTA CRUZ.

The famous West Indian island of Santa Cruz is at the present moment suffering from the vandalism of its inhabitants; its eastern portion, which twenty-seven years since was rich, populous, and of tropical luxuriance, now deprived of its forests, has become dry, arid, and worthless. It is found to be too late to retrieve the previous error, for, of a thousand trees recently planted upon an estate on this island, not one survived. The facts in regard to the island of Curaçoa are still more interesting: "In the year 1845 it was found to be an almost perfect desert. Where, according to the testimony of the inhabitants, had once been a garden of fertility, abandoned plantations, the recent ruins of beautiful villas and terraced gardens, and broad arid wastes, without a blade of grass, showed how sudden and complete a destruction had fallen upon this unfortunate little island. The cause was the cutting-down of the trees for export of their valuable timber; the effect followed even more rapidly than at Santa Cruz, as the island lies five leagues further south, and the heat is more intense. The rains have almost entirely ceased. Almost within sight of Curaçoa is

the coast of the Spanish main, covered with the rankest vegetation, over which the burdened clouds shower down abundant blessings." (*From Report of Commissioners of State Park, New York:* Hon. Horatio Seymour, chairman, and Verplank Colvin, secretary.)

ALGIERS, SAINT JAGO ISLAND.

In Algiers marked changes in the climate have followed upon the deforesting of extensive tracts, and wonderful results have followed the systematic planting of other regions. The islands of the sea have been made so many isolated experimental stations, where men have learned how essential to health the forests are; while on some of them the conclusive test of reforesting has been made with a return of showers, and a more equable distribution of heat and cold. Saint Jago, the chief of the Cape de Verde Archipelago, was, at its discovery, clothed with a forest which has been recklessly destroyed. Rain is now lacking sometimes for a whole year, a green leaf can scarcely be detected over what were once fertile lava plains, while certain of the harbors of the island have been filled up by the precious soil of the island, which has been carried down by the fierce torrents, which, alternating with drought, curse this naked island. Similar results have followed the destruction of forests on St. Helena, the Mauritius, and certain of the Canary Islands. ROTHE.

ISLAND OF TERNATE.

The effects of forests upon the general healthfulness of the State is great. The philosopher, Boyle, long since stated that in the Dutch East Indian island of Ternate, long celebrated for its beauty and healthfulness, the clove trees grew in such plenty as to render their product almost valueless. To raise the price of the commodity most of the spice forest was destroyed. Immediately the island—previously cool, healthy, and pleasant—became hot, dry, and sickly, and unfit for human residence. It is well known that the general clearing-away of the forests in this country has had a tendency to raise the temperature in Summer.—*New York Report of the Commission of State Parks.*

BUCHARIA.

Khanate of Bucharia presents a striking example of the consequences brought upon a country by clearings. Within a period of thirty years this was one of the most fertile regions of Central Asia, a country which, when well wooded and watered, was a terrestrial paradise. But within the last twenty-five years a mania of clearing seized upon the inhabitants, and all the great forests have been cut away, while the little that remained was ravished by fire during the civil war. The consequences were not long in following, and have transformed this country into a kind of arid desert. The water-courses are dried up and the irrigating canals empty. The moving sands of the desert being no longer restrained by barriers of forests are every day gaining upon the land, and will finish by transforming into a desert as desolate as the solitudes that separate it from Khiva. PHIPPS.

OHIO.

Have you never tried to find out why Southern Ohio has ceased to be the great fruit country *it was formerly known to be?* Why is it that we can not raise any more peaches in our State, while they used to bring sure crops not more than a quarter of a century ago? * * * * * What is it that makes our climate, once so favorable for mankind and vegetation, more unsteady, from year to year? Look at the woodless hills of Southern Ohio, and you have the answer.

Let the hills be deprived of the rest of the protection which the forests afford, and half of the area of this State will be sterile in less than fifty years. The rain will wash the soil from the hilltops first, and then from the slopes; the limestone, which is now covered with productive humus, loam and clay, will be laid bare; the naked rocks will reflect the rays of the sun and increase the Summer heat; the north storms will blow unhindered over the country, and every change of the wind will cause an abrupt change in the temperature. The rainfall will be diminished and become irregular. Snow and rainwater will at once run down in the valleys and cause periodical freshets, which will ultimately carry away the best part of the soil, even from the valleys. Such will be the unavoidable results of further devastation of timber. ROTHE.

KENTUCKY.

Hon. Cassius M. Clay, of Kentucky, said before the American Forestry Congress at Cincinnati: "I move in the sphere of experience with more certainty. I remember when the forests were hardly broken here that springs of water were very frequent and perennial. The rivulets and creeks and rivers had a perpetual flow. These have now changed. The rivulets and creeks are now dried up in Summer, and the fish so often caught by me in earlier years are gone. Not one spring in a thousand remains. Indian corn was generally planted in March, and the rains and exhalations of moisture from the surroundings made crops successful every year. Now, the destruction of the forests has lost to us that bed of leaves which was a perpetual reservoir of water for springs and evaporation; aided by the treading of the hard surface, the rain-fall, if the same as of old, rushes off at once, sweeping the soil into the Mississippi delta. The dry winds absorb not only the ancient humidity of the air, but drink up the subsoil evaporation, so that our Winters are longer, more changeable, and unendurable. Corn can hardly be safely planted till late in April, and drouth too often ruins all in spite of our best efforts.

MASSACHUSSETTS.

Prof. Sargent, of Harvard University, who has given this question as much study as any one in America, says: "As moderators of the extremes of heat and cold, the benefits derived from extensive forests are undoubted, and that our climate is gradually changing through their destruction is apparent to the most casual observer. Our Springs are later, our Summers are drier, and every year becoming more so; our Autumns are carried forward into Winter, while our

Winter climate is subject to far greater changes of temperature than formerly. The total average of snowfall is perhaps as great as ever, but it is certainly less regular and covers the ground for a shorter period than formerly. Twenty years ago peaches were a profitable crop in Massachusetts; now we must depend on New Jersey and Delaware for our supply; and our apples and other orchard fruits now come from beyond the limits of New England. The failure of these and other crops in the older States is generally ascribed to the exhaustion of the soil; but with greater reason it can be referred to the destruction of the forests which sheltered us from the cold winds of the north and west, and which, keeping the soil under their shade cool in Summer and warm in Winter, acted at once as material barriers, and reservoirs of moisture."

THE NORTHWEST.

"I had an opportunity," says Mr. Rothe, "to observe and study the results caused by the destruction of the forests in the Northwest. Thirty years ago steamboats drawing six feet of water made regular trips on the Upper Mississippi up to St. Paul. Now the navigation with boats of half that draught is uncertain. Nearly all the tributaries of the Upper Mississippi have also lost one-half, or even more, of their former supply of water. Inundations in the Spring are now frequent, while now in the Summer time the depth of many of these rivers average hardly more inches than could be measured by feet thirty years ago. Water-powers, which were formerly deemed to be inexhaustible, have entirely been abandoned, or their failing motive power has been replaced by steam. In the remembrance of the older settlers the climate of Wisconsin and Minnesota was remarkably steady, the Winters were long and cold, the supply of snow ample and regular, and late frosts in the Spring were unusual. Now the inhabitants complain of abrupt changes of the temperature in all seasons of the year, and of the irregularity of the snow-fall. The Legislature of Wisconsin has already paid attention to these alarming facts, and has taken the preservation of existing forests, and the establishment of artificial ones, in earnest consideration. By a resolution recently passed, it asks of the National Government the transfer for that purpose of all unsold public lands to the State which are now despoiled of their timber by thievish lumbermen."

ARIZONA.

In the Territory of Arizona an immense number of deserted Indian dwellings carved out of the rocks were recently discovered. The former inhabitants of the same must necessarily have been a sedative people, devoted to agriculture, but the whole district is now nearly a desert, there being no supply of water, and hills as well as plateaus and valleys are dry, stony, and nearly destitute of vegetation. This can not have been the condition of that district when it was densely populated by hundreds and thousands of Indians. Now the only plausible solution of the ethnographical enigma which is here propounded to us, is the following: The hills and slopes there were once stocked with lum-

ber, which was wasted by the inhabitants. The same deterioration of the country gradually took place which we notice in Palestine, Greece, and Scicily, where the people had to emigrate to avoid starvation.

But enough of the warning examples of history.

It is not too late to repair all the damage that has been done in America by the devastation of our natural forests. A regulation of the use of the timber may be effected without any injury to the legitimate lumber trade, and the replanting as well as the establishment of artificial forests, may undoubtedly be made profitable for private as well as for public enterprise. If it is remunerative to acclimatize and extensively raise American trees in Germany and France, where the soil is much higher in price than here, why should it not be lucrative to cultivate them in those parts of the United States in which the timber is scarce and precious? They grow quicker here and to greater perfection than anywhere else. Nature has lavishly provided this country with an uncommonly large number of the most valuable species of trees. There are not more than thirty-five species and distinct varieties of native trees in France which attain a height of over thirty feet, not more than sixty-five in Germany, but over one hundred and fifty in the upper part of the Mississippi Valley alone. All Europe possesses not a single native walnut tree. (The so-called English walnut is of Asiatic origin.) We have nine varieties of hickory and two of walnut proper. You may search all the world over in vain to find a sort of timber which, in general usefulness, can rival our hickory tree. Our walnut and oak varieties alone outnumber all the varieties of trees native to France and Spain.

A benign nature has lavishly provided for this country; but does that give us a right to waste these blessings, destined for the human race of all future ages, within the short life of a few generations, like spendthrifts? Shall we adopt the most detestable motto of a modern Sardanapalus, "*Après nous le deluge!*"—anticipate every thing, and leave nothing for those who will come after us? Will America's pride bear the humiliating prospect of having the immense work of culture, which so far has been achieved in this country by the most intelligent, independent, progressive, and energetic of all nations, frustrated by the unavoidable consequences of our greedy mismanagement of the natural resources of our country? Shall the future of this great republic be made uncertain by a gradual deterioration of soil and climate, or shall it forever remain the happy and comfortable home of the free? Is not the care for future generations one of the most solemn duties imposed upon us by laws of humanity and morality. Are we worthy to enjoy the bequest of our forefathers if we are not just and liberal enough to provide for our descendants.

ROTHE.

NEVADA.

The Nevada *Enterprise* in speaking of the effect that the partial stripping of the forests on the sides and summits of the Sierras will have, says: "Already one change has occurred that is evident to the most ordinary observer, which is the speedy melting away of the snow on the mountains. It now goes off at once in a flood, with the

first warm weather of Spring, whereas, formerly, lying shaded and protected by the pines and other evergreen trees, it melted slowly, and all Summer sent down to the valleys on both the eastern and western slopes of the Sierras constant and copious streams of water. Instead of a good stage of water in our streams throughout Summer, as in former times, there is a flood in the Spring, and when this is past by, our rivers speedily run down, and, being no longer fed from the mountains, evaporation leaves their beds almost dry when the hot weather of Summer comes on."

FORESTS AND THEIR MANAGEMENT IN OTHER COUNTRIES.

GERMANY.

In Germany the management of forests by the state has been carried on for hundreds of years, and, as we have seen, vast tracts of sterile land have been redeemed by government forestry. "Here we find a model or precedent not only of systematically planting thousands of acres of trees, but a general system of forest management, commencing by a careful survey, stock-taking, and commutation of all rights; careful experiments in the rate of growth; the best soil for each description of tree; in fact, in every branch of the subject, and resulting in what we find to-day: hundreds of thousands of acres mapped, divided into periods and blocks, and worked to the best advantage both with regard to present and future, and the annual yield of which now and for many years to come, is known and fixed to within a few hundred cubic feet. In Prussia there are twenty millions of acres of forests, ten millions of which are state forests. Of these the income is $14,000,000, and the expenses $7,500,000, leaving $6,500,000 clear profit. When it is considered that this result is arrived at without trenching on the capital or stock of timber in the forests, which, on the contrary, is being increased and improved in every province of the kingdom, and that the indirect value to the people of many forest privileges, which they exercise free of charge, must be very great, not to mention an improved climate, some idea may be arrived at of the enormous value and benefit such a system of forests must confer on Prussia. The forests form part of the finance department, and are presided over by an overland-forest-master and ministerial director, and others. There are two forest academies, one near Berlin, and one in Hanover. There are twelve provinces in Prussia divided into thirty circles, and to each an over-forest-master. Next in order come the forest-masters, numbering one hundred and eight, in charge of divisions with an average area of sixty thousand acres, and then the executive officers, seven hundred and six over-foresters, to each of whom is 7,000 acres, and to each of these is attached a cash-keeper; and then there are 3,646 foresters, or overseers, with ranges of 1,000 to 3,000 acres. At the forest academy near Berlin there are seven professors with assistants. There is an experimental garden attached, with an over-forester in charge of the technical portion, and professors for the meteorological, zöological and

chemical sections. The varied apparatus includes a building where seed is dried and separated from the cones; large seed-bed of spruce, fir, willow; full opportunities of transplanting seedlings, and examples of every kind of tree for botanical study. There is also a museum rich in specimens of all sorts of birds, animals, and insects found in the forests. In cases where the animal or insect does damage to trees, specimens of the branch, bark, leaf, or cone, in a healthy state, and after being attacked, are exhibited, close to each, so that the students can see at a glance the nature of the damage, and connect it with the animal which causes it. Insects are shown in the several stages of their existence—larvæ, chrysalis, caterpillar, moth—with their ramifications in the stem or branches of the tree. These, with specimen blocks of almost all descriptions of timber, form a most instructive collection. There is a forest district attached. . . . In the national appropriation bill, large sums are set apart for the purchase of such lands as are unfit for cultivation, and for utilizing the same by planting trees." PHIPPS.

HANOVER.

In Hanover, a province of Prussia, there are 600,000 acres in the government forests, and the cost of working and all expenses, $650,000 annually; the receipts, $1,500,000, and the profit $850,000. Here the steepest and most rocky sides of the hills are all covered with forests, which have been created by the labors of the Forest Department. In many such places, where even the few handfuls of soil placed round the young tree had to be carried some distance, it is not contended that the *first* plantation will yield a pecuniary profit, but the improvement in climate by the retention of the moisture, and the reclamation of large tracts, formerly barren and unproductive, is taken into account; besides which the dropping of leaves and needles from the trees will, erelong, create a soil and vegetation, and insure the success of plantations in future years. PHIPPS.

SAXONY.

The state forests are nearly 400,000 acres, worked at an expense of $500,000, receiving $1,750,000, leaving to the government a clear rental of $1,250,000. There is a forest academy at Thorandt. The state forests of Bavaria are 3,000,000 acres. They return, after paying all expenses, $4,500,000 per annum. PHIPPS.

AUSTRIA.

The state forests of Austria contain 2,000,000 acres. The forest academy is at Miriabrunn, near Vienna. The collections belonging to the academy are fine. PHIPPS.

SWITZERLAND.

In no country in Europe has the waste of forests been more rapid or destructive than in Switzerland, and in none, perhaps, has this improvidence been followed by more disastrous results. The woods, being considered common property, were uprooted, and the soil on the mountains, being exposed to the wash of the rains, was rapidly carried away, leaving broad areas of naked rock, from which the water would at once

sweep down the valleys in sudden and destructive inundations. The Autumn of 1868 is memorable on account of these floods. Public attention has, however, been thoroughly awakened, and active preparations are in progress to remedy the evils. The cantons which have charge of these operations have for some time, at great expense, been constructing works to control the streams and planting trees. The matter is now in Switzerland taken in hand by the national government.

FRANCE.

The forests of France, under the management of a government bureau, contain 7,500,000 acres. Of schools of forestry the French have, at Nancy, one of the best in the world, where pupils are instructed both experimentally and theoretically in all forest-learning, the collegiate home studies being constantly varied by excursions of parties of students under charge of professors to those forests where, at the time, most can be learned.

ITALY has established a forestry school, near Florence; Russia, two forest schools—one at St. Petersburg and one near Moscow. In Sweden forest regulations extend as far back as 1647, and then before that private owners were required to plant and protect from cattle two trees for each one cut. PHIPPS.

DENMARK.

Denmark is one of the most poorly wooded countries of Europe, the percentage of woodland being now only 4.25 of the whole area. This small proportion is caused chiefly by the nakedness of the western part of Jutland, where the west winds have seconded the action of man in destroying the forests. Much of the wood, which at one time covered nearly the whole of Denmark, having been cut down to make way for agriculture, and to supply fuel and timber, a vast area thus bared has become a sandy, heathy desert.

Effective measures are now taken by the Danish Government to preserve the remains of the woodland, and to create new plantations. The state forest department permits only small portions of old forests to be cleared at a time, and insists on simultaneous planting of an equal area. The Danish forest school is at Copenhagen, and forms a branch of an agricultural college.—*Encyclopædia Britannica.*

HOW MOISTURE IS RETAINED BY FORESTS.

The whole forest in its natural state forms a reservoir admirably fitted to receive large supplies of moisture, to hold it for a lengthened time, and to part with it at intervals well calculated to benefit the vegetation of the surrounding country. The bed of the forest is a widely spread surface, piled thick with leaves, twigs, pieces of fallen branches, and remnants of decayed logs, covering another layer of the same substances in a state of partial decomposition, overlying yet another strata completely decomposed,—altogether forming a deep pot or hollow framework, penetrated with myriads of pipes, tubes, and aqueducts, and interspersed with millions of miniature logs, blocking

and holding in position the flow of water, until the humus below fully absorbs it; while the whole surface of the earth is crossed, recrossed, and crossed again by a checker-work of partially elevated roots, the box-like openings between which perform the same function. If we go below the surface, we shall find the solid earth beneath the mass of vegetable decomposition, pierced everywhere with upright and porous pillars of wonderful tubular structure—the large and perpendicular tap-roots which many trees possess pass deep into the solid, clayey strata, otherwise impermeable, and sending through the triturated earth which surrounds them a slow and steady supply of water to a thousand subterranean and spring-feeding channels, which, traveling away from the forests and under the cultivated fields, supply the great lower bed of moisture, that, continually rising, fertilizes the upper soil.

PHIPPS.

THE protection afforded by the forest against the escape of moisture from its soil by superficial flow and evaporation insures the permanence and regularity of natural springs, not only within the limits of the woods, but at some distance beyond its borders, and thus contributes to the supply of an element essential to both animal and vegetable life. As the forests are destroyed, the springs which flowed from the woods, and, consequently, the greater water-courses fed by them, diminish both in number and volume. This fact is so familiar in the United States and the British provinces that there are few old residents of the interior of those districts who are not able to testify to its truth as a matter of personal observation. My own recollection suggests to me many instances of this sort; and I remember one case where a small mountain spring, which disappeared soon after the clearing of the ground where it rose, was recovered about twenty years ago by simply allowing the bushes and young trees to grow up on a rocky knoll, not more than half an acre in extent, immediately above the spring. The ground was hardly shaded before the water reappeared, and it has ever since continued to flow without interruption. The hills of the Atlantic States formerly abounded in springs and brooks; but in many parts of these States, which were cleared a generation or two ago, the hill-pastures now suffer severely from drought, and in dry seasons furnish to cattle neither grass nor water.

MARSH: "*The Earth as Modified by Man.*"

EFFECTS OF THE CUTTING OF FORESTS ON WATER SUPPLY OF RIVERS.

Upon the territory of the commune of Labrugniere (a village of France) there is the forest of Montant, containing 4,524 acres, and owned by the commune. At the entrance of the forest, and along this brook, will be found several fulling mills, each requiring eight-horse power, and moved by water-wheels which work the belters of the machines. The commune of Labrugniere had long been noted for its opposition to the forest regulations, and the cutting of wood, together with the abuse of pasturage, had converted the forest into an immense waste, so that this great property would hardly pay cost of

guarding it, and afford a meager supply of wood for its inhabitants. While the forest was thus ruined and the soil denuded, the waters after each heavy rain swept down through the valley, bringing with them great quantities of gravel, the *débris* of which still encumber the channel of the stream. The violence of these floods was sometimes so great that they were compelled to stop the machines for some time. But in the Summer-time another inconvenience made its appearance. Little by little the drought extended, the flow of waters became insignificant, the mills stood idle, or could run only occasionally for a short time.

About 1840 the municipal authorities began to inform their population relative to their true interests, and under the protection of better supervision the work of replanting has been well managed, and the forest is to-day in successful growth. In proportion as the re-planting progressed, the precarious use of the mills ceased, and the regulation of the water-courses was totally modified. They now no longer swell into sudden and violent floods, compelling the machines to stop; but the rise did not begin until six or eight hours after the rains began, they rose steadily to their maximum, and then subsided in the same manner. In short, they were no longer obliged to stop work, and the waters were always enough to run two machines and sometimes three. This example is remarkable in this, that all the other circumstances had remained the same, and therefore, we could only attribute to the reforesting the changes that occurred, namely, diminution of the flood at the time of rain and an increase in its flow during common times.

M. CANTEGRIL, *sub-inspector of forests, in Ami des Sciences.*

THE RAIN AND FORESTS.

There is nothing of greater importance to the agriculturist than rain at the proper season and in proper quantity; and science has demonstrated that the forests of a country are potent in the regulation of storms, the formation of clouds, and the descent of rain. Any thing which vitally affects the interests of the farmer and producer affects the whole State, and demands the earliest attention of the people's representatives.—*New York Report of the Commissioners of State Parks.*

FLOODS.

The reckless destruction of forests, so strongly condemned by many American writers, which has been practiced by their countrymen, is now bearing its fruits in the terrible Spring and Autumn floods which of late years have affected large portions of the United States. The Americans might spare much of their care for the channels of the Mississippi if they would restore the groves cut from the hills which feed its sources. To disforest a mountain slope is to devote the height to barrenness, the valley to flood, and both to parching drought when drought is most injurious. PHIPPS.

WHEREVER the forests have disappeared, the Spring inundations of the rivers have acquired a frequency unknown before. It can not be disputed that the terrible destructive effects of the inundations of the Loire and the Vistula, of late years, must be in great part attributed to the excessive denudation of the forests.

SCHACHT, *Professor at the University of Bon, "Les Arbres."*

IMMENSE AMOUNT OF WATER GIVEN TO THE ATMOSPHERE BY TREES.

The amount of moisture given out by trees is immense. In some trees the upward rush of moisture from the roots is very powerful. The workmen in ship-yards frequently find in the center of a teak log a core of sand fifty or sixty feet long, an inch in diameter, and hardened to a marble-like consistency, which has been carried and deposited there by the sap in its upward course.

WASHINGTON ELM.

A few years ago a number of scientists of New England made a calculation as to the amount of water given to the atmosphere by the "Washington Elm," Cambridge, Mass. They calculated that the leaves of that tree would cover over 200,000 square feet of surface, and that they gave out every fair day during the growing season 15,500 lbs., or $7\frac{3}{4}$ tons, of moisture. J. B. P.

HEALTHFULNESS OF FORESTS.

The influence of forests on the healthfulness of the atmosphere demands thoughtful attention. Plants imbibe from the air carbonic acid, and other gaseous and volatile products, exhaled by animals or developed by the natural phenomena of decomposition. These the trees, more than the smaller plants, absorb, and instead of them pour into the atmosphere pure oxygen, essential to the life of animals. The carbon, the very substance of wood, is taken from the carbonic acid thus absorbed. "Humid air," says Bequerel, "charged with miasmata, is deprived of them in passing through the forest." R. W. EMERSON.

A MOUNTAIN cliff, a wall, or a forest, are the natural protection against the wind. In this respect the forest can not be without beneficial effect on the adjacent country; the young growth of trees flourishes, screened from the force of the wind, the arable land develops itself better, sands meet an impassable barrier, and the noxious influence of the dry winds is turned aside. It is, then, indisputable that the forests exercise a salutary influence on the temperature of a country. The sanitary condition of man and the domestic animals, as well as the growth of cultivated plants, depends on the climate of the locality. The fertility of a country depends on its supply of forest land; for on this depend the foundation of soil, the precipitation of dew, the fall of rain, the steady current of rivers, the mitigation of the evil influences of unhealthy winds, and the growth of vegetables in the fields and meadows. SCHACHT.

TO ARREST a pestilence by quarantine, the State sternly interrupts trade, travel, and pleasure; but the far greater mortality from the increasing fickleness and cruelty of our climate can be arrested by the gentlest means. It is needed only that our broad States shall have one-fourth or one-fifth of their surface covered with trees—which, by the way, may be so distributed as to increase the value and producing power of lands. It is needed only that the road sides shall be well planted, that all hills shall be fixed forever with woods, that the rivers shall be fringed with appropriate species, and that woods shall be wood, in fact, and not struggling collections of the dying monarchs of the primeval forest. Along with a better climate will come not only the better health and longer lives, but forgotten springs will gush anew from the hills, the attenuated streams will fill their banks again—and yield us a better fish supply—and will cease to drown the valleys with floods after every rain. DANIEL MILLIKIN.

MECHANISM OF A TREE.

A tree (and I beg my readers to follow this attempt at explanation closely—all depends upon it) receives its nourishment from the roots. These correspond to the mouth in the human frame. Now, as in the human frame the nourishment received is, after being supplied to the blood, exposed to the operation of air in the lungs before it is fit to give material to the body, so in a tree, the nourishment taken in at these tree mouths, the roots, passes to the lungs of the tree, and there, by contact with the air, is rendered fit to supply fresh material to the tree. These tree lungs are the leaves. This operation is affected by the passage upward from the soil around the roots, through the trunk, the branches, and every twig of the tree to the leaves, of a large quantity of water, containing in solution the nutriment for the tree. Arrived at the leaves, a process takes place which separates, by means of contact with the air, most of the water the roots had taken in, from the valuable nutriment, and throws off, in vapor, the surplus water into the air. At this time certain constituent portions of the air are utilized and mingled with the nourishment retained. This is all, now a small portion in comparison with what had arisen from the roots, yet retaining enough water to serve as as a vehicle back, is returned toward the roots; depositing in its way, in leaf, bark, and root, what is needed there for the growth of the tree. In these, they undergo, especially in the bark, further fitting and digesting processes before they assimilate with the substance of the tree. The water which was retained to carry them down, being no longer needed, passes out at the roots. . . . In the back of the leaf are numerous stomates or mouths. . . . Of the extent of the provision made for evaporation by the leaves, some idea may be formed from a consideration of the number of *stomata* or stomates to be found in the leaves of plants. The number varies in different plants, for which variation a reason may be found in the different conditions of growth to which they are subjected in their several natural habitats. In the back of the leaf of the apple tree there are about twenty-four thousand stomates to the square inch. In the leaf of the

lilac there are a hundred and sixty thousand of them to the square inch. In the leaves of the cherry-laurel there are none on the upper surface of the leaf, but ninety thousand have been counted on the lower surface. PHIPPS.

PROPORTIONATE AREA OF WOODLAND.

MEN need to be taught to plant trees, and their children to plant and love them. Owners of good lands in Maine or elsewhere will in the future learn that their bleak fields, if judiciously planted with wood to the extent of 40 per cent of area, will produce on the remaining 60 per cent more in all kinds of crops than the whole does now or can be made to do under any other possible course of treatment. Lands well sheltered can and do produce Winter wheat in Maine as well as on the new lands at the West. In accordance with this memorial, the State Legislature provided for exemption for twenty years from taxation of all cleared land on which forest trees had been successfully cultivated for three years, and maintained in a thriving condition thereafter.—*Committee on Agriculture.*

WHAT portion of the area of the State should be covered with forests? Economists estimate about twenty-five per cent as a suitable proportion; but this varies with the position, physical character, and commercial interests of the country under consideration. "I do not pretend that the whole of our farms should be planted in forests trees," says Hon. H. G. Joly, of Quebec; "that would be absurd. Our farms are generally too large for the small number of hands we employ; there are always some odd corners, idle strips, stony or damp patches which it does not pay to cultivate. Begin and plant forest trees there, suiting the tree to the nature of the soil—you will find some for every kind of soil. Once planted and fairly started, they will take care of themselves, give no trouble, and increase yearly in value. If every acre of ground were covered with valuable crops, one would try and get reconciled to the absence of trees, and bow to the iron rule of our age which converts every thing into cash. But what a small proportion of all that ground is used profitably! We can find plenty of spare room for growing forest trees; they are not only the most beautiful ornaments to a country, and the most useful product of nature, giving fuel, timber, shade, shelter, retaining moisture, and a protection against droughts, etc., etc., but, considering the question from a *strictly money-making* point of view, the culture of forest trees is perhaps the *best and safest investment* that can be made."

NOTES.

ROADSIDE TREES.

IN Germany, France, Italy, and many other countries of Europe, as has been seen, large forests are planted annually under the direct supervision of the several governments; but besides these and private forests, trees are planted in great numbers by the roadsides. At present the total length of public roads of France is 18,750 miles, of

which 7,250 miles are bordered with trees, while 4,500 miles are at present being planted or will shortly be planted. On the remaining 7,000 miles the nature of the soil does not admit of tree growth. The number of trees already planted by the roadsides in France amounts to 2,878,603, consisting principally of elm, poplar, acacia, ash, plane, sycamore, and limes. In Germany many thousands of miles of roads are shaded by trees; in some parts they are forest trees, in others fruit trees. I regret that I have n't the exact statistics.

ALL lovers of trees should hold in grateful remembrance the name of Hon. James Hillhouse, of New Haven, Connecticut, who beautified that city by planting with his own hand the elms that have since made it famous.

"I HAVE always admired," says Whittier, "the good taste of the Sokoki Indians around Sabago Lake, who, when their chief died, dug around a beech-tree, swaying it down, and placed his body in the rent, and then let the noble tree fall back into its original place, a green and beautiful monument for a son of the forest."

"PLANTING and pruning trees," Sir Walter said, "I could work at from morning till night. There is a sort of self-congratulation, a little tickling self-flattery in the idea that while you are pleasing and amusing yourself you are seriously contributing to the future welfare of the country."

FAMOUS TREES.

A few famous trees of this country, not named in the extract from the letter of the historian Lossing, are given here. The "Burgoyne elm," at Albany, N. Y.—This tree was planted on the day the British general, Burgoyne, was brought a prisoner into Albany, the day after the surrender. The weeping-willow in Copp's burying-ground, near Bunker Hill—This willow, grown from a branch taken from the tree that shaded the grave of Napoleon at St. Helena, now waves over that of Cotton Mather, so noted in Salem witchcraft. Copp's burying-ground is so near where the battle was fought that a number of grave-stones can be seen to-day which were pierced through by bullets fired by British soldiers in that battle. The ash-trees planted by General Washington at Mt. Vernon—These ashes form a beautiful row of immense trees, which are the admiration of all who visit the home of the "Father of his Country."

J. B. P.

THE CARY TREE—PLANTED BY ALICE AND PHŒBE CARY.

In 1832, when Alice was twelve years old, and Phœbe only eight, as these little girls were returning home from school one day, they found a small tree, which a farmer had grubbed up and thrown into the road. One of them picked it up, and said to the other, "Let us plant it." As soon as said, these happy children ran to the opposite side of the road, and with sticks—for they had no other implement—they dug out the earth, and in the hole thus made they placed the treelet; around it, with their tiny hands, they drew the loosened mold, and

pressed it down with their little feet. With what interest they hastened to it on their way to and from school, to see if it were growing; and how they clapped their little hands for joy when they saw the buds start and the leaves begin to form! With what delight did they watch it grow through the sunny days of Summer! With what anxiety did they await its fate through the storms of Winter, and when at last the long-looked for Spring came, with what feelings of mingled hope and fear did they seek again their favorite tree!

But I must not pursue the subject further. It is enough to know that when these two sisters had grown to womanhood, and removed to New York City, they never returned to their old home without paying a visit to the tree that they had planted, and that was scarcely less dear to them than the friends of their childhood days. They planted and cared for it in youth; they loved it in age. That tree is the large and beautiful sycamore which one sees in passing along the Hamilton turnpike from College Hill to Mt. Pleasant, Hamilton County, Ohio. J. B. P.

"OLD LIBERTY ELM."

It was the custom of our New England ancestors to plant trees in the early settlement of our country, and dedicate them to liberty. Many of these "liberty trees," consecrated by our forefathers, are still standing. I remember, when a boy, the interest I felt in "Old Liberty Elm," that then stood in Boston. That old tree was planted by a schoolmaster long before the Revolutionary War, and dedicated by him to the independence of the Colonies. Around that tree, before the Revolution, the citizens of Boston used to gather to listen to the advocates of our country's freedom; around it, during the war, they met to offer up thanks and supplications to Almighty God for the success of the patriot armies; and, after the terrible struggle had ended, the people were wont to assemble from year to year in the shadow of that old tree to celebrate the liberty and independence of our country. It stood there till within a few years, a *living* monument of the patriotism of the citizens of Boston. The sight of that tree awakened patriotic emotions in every true American Heart. And when at last that old tree fell, the bells in all the churches of Boston were tolled, and a feeling of sadness spread over city and State. Even in Ohio, there were eyes that moistened with tears when the news came that "Old Liberty Elm" had fallen in a storm. Such was the veneration in which it was held. J. B. P.

"WASHINGTON ELM."

Another of these "liberty elms" now stands in Cambridge, Mass. Under the shade of this venerable tree Washington first took command of the Continental army, July 3, 1775. How the affection of every lover of his country clings around that tree! What care has been taken of it, what marks of esteem have been shown it by the citizens of Cambridge, may be judged by those who have seen it standing, as it does, in the center of a great public thoroughfare, its trunk protected by an iron fence from injury by passing vehicles, which for more than a century have turned out in deference to this monarch of the Revolution. J. B. P.

ARBOR DAY.

Teachers can easily interest their pupils in adorning the school grounds. With proper prearrangement as to the selection and procuring of trees, vines, or shrubs, Arbor Day may accomplish wonders. Many hands will make merry, as well as light, the work. Such a holiday will be an attractive occasion of social enjoyment and improvement. The parents should be persuaded to approve and patronize the plan. It tends to fraternize the people of a district, when they thus meet on common ground, and young and old work together for a common object, where all differences of rank, or sect, or party, are forgotten. The plantings and improvements thus made will be sure to be protected. They will remain as silent, but effective teachers of the beautiful to all the pupils, gradually improving their taste and character. Such work done around the school naturally extends to the homes. You improve the homes by improving the schools as truly as you improve the schools by improving the homes. "The hope of America is the homes of America." It has long been my ambition to improve the homes and home-life of our industrial classes and help them to realize that the highest privilege and central duty of life is the creation of happy homes, for the home is the chief school of virtue, the fountain-head of individual and national strength and prosperity. It is a worthy ambition to surround one's home and children with such scenes and influences as shall make the every-day life and labors brighter and happier, and help one to go sunny and singing to his work. Our youth should early share in such efforts for adorning the surroundings of their homes, and planting trees by the wayside. How attractive our roads may become by long avenues of trees. This is beautifully illustrated in many countries of Europe.

Arbor Day will become one of the institutions of the country, in which our boys and girls will take an eager share and genuine pleasure, and thus gain a liking for trees that will never be effaced. Nebraska has the honor of originating Arbor Day. Some ten years ago, at the request of its State Board of Agriculture, the governor appointed the second Wednesday in April as the day to be devoted to economic tree-planting, and it is claimed that twelve millions of trees were planted on that day. The successive governors have continued thus to recognize this day. The schools last Spring adopted the "Cincinnati plan" of planting "memorial trees."

The recent Spring floods and Summer droughts in Indiana, Ohio, and elsewhere, increasingly and now alarmingly destructive, are calling public attention to the cause and remedy as never before. The denudation of the hills and mountain sources of the springs is the leading cause of these freshets, and these can be remedied only by the extensive re-foresting of such lands. This great result, which must be the work of time, will be best accomplished by interesting the young, as well as the old, in tree-planting. The Arbor Day in schools will do immense good in this direction. We need to popularize and diffuse the sentiment of trees. This will best secure their propagation and protection. The frequency of forest fires is the common objection to economic tree-planting. But let the sentiment of trees be duly

cultivated, and they will be regarded as our friends, as is the case in Germany. The public need to understand that the interests of all classes are concerned in the conservation of forests, In Germany, Switzerland, Sweden, and other European countries, this subject is so taught in their schools that the people generally appreciate the value of trees and the need of protecting them. Hence an enlightened public sentiment is a better guardian of their forests than the national police.

HON. B. G. NORTHROP.

IT is vital to the future welfare of our people that the reproduction of the forests should at once begin, not on a small scale or in few localities, but in large measures and co-extensive with our settlements. A broad statesmanship, in our national and State Legislature, should at once take up the subject, and deal with it year by year until the great work shall be adquately begun.

There can be no doubt of the beneficial influence of the forest areas equal in aggregate to one-fourth or one-third of the entire area of any extensive region. But however important climate effects may be in this connection—however desirable it may be that the crops and animal life of the farm should enjoy the benefits of forest influences and shelter, the need of extensive forest planting is important enough without taking into consideration its effect on atmospheric movements, temperature, and rainfall. The store, the dwelling, the shop, the factory, the railroad, the wharf, the warehouse—all these demand action; demand it in the name of domestic life, of farm economy, of commerce, of all the arts of our civilization. What we shall save in climate by preserving forest areas, or gain by their extension, is just so much to be enjoyed in addition to other compensations.

DR. JOHN A. WARDER.

DESTRUCTION OF FORESTS IN OHIO.

Ohio was once supposed to possess an unfailing supply of black walnut, but it has been shipped into other States and to foreign countries in such vast quantities that there is now scarcely a first-class tree of this kind to be found in her bounds. Much of it has been shipped to Austria. Since 1850 Ohio has suffered the destruction of a vast proportion of her forest area. Between the years 1853 and 1870 there were cleared over four million two hundred thousand acres—equal to one-sixth of the entire area of the State, and equivalent to the removal of the timber from an entire county each year. In his last message to the Ohio Legislature, Governor Bishop stated that during the years between 1870 and 1878 over four million five hundred thousand acres of timbered land had been cleared, which was nearly one-half the entire acreage of 1870. To restore the forests of the state to the condition of fifty years ago would require not less than two hundred years. Consequent upon the destruction of the forests many rivers have become diminished, among which Bryant named the Cuyahoga; and from the same cause—the destruction of our forests—other streams are drying up in Summer.

DAVID D. THOMPSON.

HOW TO PLANT TREES.

The following articles are taken from the writings of experienced tree-planters:

SOME THOUGHTS AND SUGGESTIONS ON TREE-PLANTING.

One of the first and most important considerations is the adaptation of the kind of tree to the soil which is to become its new home. It would be useless to plant a weeping willow or a swamp cypress on a high, dry, and stony hill. None of the genera which naturally select elevated and dry localities should be planted in low and swampy grounds. The constituents of the soil may vary greatly, but the constant supply of moisture in the new locality should vary but little from that in which the tree to be transplanted originally grew.

Any kind of tree whose stump sprouts freely after its trunk has been cut away will grow readily after transplanting, if the work has been properly done at the right time. The stump of the pine tree, and indeed of many of the coniferæ, rarely sprouts. Every one who has tried it, and has succeeded knows what a triumph it is to nurse into vigorous life and growth a pine tree or a hemlock tree after transplanting it.

The best time to plant trees is in the Spring before the buds have begun to swell. The top and branches should be well cut back. If this be done in the Fall, previous to transplanting, so much the better, as it saves the tree much vital force.

To insure the growth of a tree, it should be removed with the greatest of care, so as to keep intact as many of the rootlets and their terminal spongioles as possible. The sooner a tree be planted after its removal the better are its chances for growing. Within certain limits the smaller the tree and the larger the root the surer is it to grow.

The place a tree is to be set should be thoroughly prepared by spading up the soil to the depth of two feet or more;* then filling up with loose, rich soil to the proper height. The tree may now be set into the place prepared for it. The surface of the fine soil upon which you set the tree should be adapted to the inequality of the roots, so that the tree will stand erect and alone. While the fine soil is being sifted upon the roots, the tree should be churned up and down with a gentle motion, so there be left no empty space under and around the roots. A pail of water should now be poured on the soil about the roots (this should be done with watering can or sprinkler), so as to insure their close embrace and to afford some food for the fasting tree.

The soil should not be heaped up around the tree, but pressed down, but not too firmly, to the level of the surrounding surface.

The ash, the oak, the chestnut, the hickory, the walnut (black and white), the maple, and the tulip all respond readily to the above treatment.

A. D. BINKERD, M. D.

*NOTE.—In sandy soil or in drained ground this will do, but in clayey soil the hole must not be dug too deep, as it forms a reservoir of water which will often kill the tree.

TRANSPLANTING TREES.

Nearly every one who lives in the country at some time plants trees, but how few know just how to do it properly!

At the outset it is necessary to bear in mind that the tree is a living body, and that the process of removal interferes with its functions, and when it is displaced from the ground, causing an arrest of the circulation that is constantly going on between the tree and the soil, a severe shock is sustained. Every root-fiber destroyed lessens by so much the chances of success, and when a greater portion of these are gone, the tree is forced to depend on its own vitality to supply a new set of rootlets before growth can take place.

In the beginning bear in mind that it is important not to injure the roots and to preserve as many as possible, particularly the small ones, for these are what must be depended on to start the growth in the new life. Where trees are dug up to be removed a short distance, preserve all the roots if possible.

When the tree is out of the ground, exposure to the sun or drying winds will cause evaporation, which is very detrimental to the tree, and is a common cause of failure, and one which is often overlooked. If, however, the tree has become shriveled and dried, vitality may often be restored by burying the whole tree for a few days in moist soil; but it is far better not to have them get in condition to need any such remedy, which at best can not restore the tree to its original condition.

In excavating holes for planting, it is not necessary to dig very deep, unless for a tree with a tap-root; it may even be hurtful in a hard soil by affording a place to hold water under a tree to its injury. The roots of young trees grow near the surface, and the holes should be large enough to allow the roots to be extended their full length without cramping or bending.

In case it is very dry at the time of planting, it is a good plan to puddle the soil around the roots, always covering with dry earth. In this way moisture will be retained for a long time. Avoid too deep planting. The roots must not be placed beyond the action of the air; about the depth they were in before removed, or a very little deeper. When filling, press the earth from the first firmly, so as to leave no spaces, and have it compact about the roots. This latter point can not be too thoroughly attended to, and, of course, to do this well, the soil must be finely pulverized and no lumps be allowed in the filling. It will be necessary to use the hand to place the soil in spaces where the spade can not go.

The time of setting is best when the soil has settled in the Spring and become warm, so that trees not being removed begin to start. Earlier than this is not so well, for the sooner the tree begins to grow after being set the more likely to do well. We believe the proper time is the Spring, the best time for planting all kinds of trees, although early Fall planting is often recommended. Evergreens often succeed well planted in August; still we would rather risk them in the Spring, just as they are ready to grow. When you would plant early potatoes is a good time to plant trees. Evergreens are the most sensitive of any to drying while being removed, and if once allowed to become dry it is

all-day with them; no amount of pains or trouble can restore the lost vitality. For this reason they can be removed but short distances unless very carefully packed.

As more or less of the roots are removed or injured, it is necessary to prune the top when transplanted. This has generally been done by cutting all the branches back; but a better way is to remove a portion of the branches, leaving those strong ones that are in position to give the tree a well-shaped top. If all the branches are left, and the proportion between the tops and roots balanced by cutting all back, in after-growth some of these branches will require to be removed—an injury, perhaps, to the tree. This certainly will apply to fruit-trees. Sometimes trees for ornament or shade require to be cut back to make a thicker top or one more symmetrical. Large trees are removed in Winter with a large ball of earth attached to the root, and, though a heavy job, it is the only successful method of doing it. A trench can be dug at the proper distance around the tree, and filled with coarse litter previous to freezing, and also the holes to receive the trees, which will much facilitate the labor.

Small trees do better than large ones, and it is better to be to the trouble of taking care of them one or two years longer than to have them grow too long in the nursery row. Trees grown on good soil are better than from poor soil. They have more and better roots, and are in better condition to grow in their new location. Of course, it is not desirable that the soil where they have grown should be so rich as to produce such a growth that the wood will not properly ripen, but sufficient to make a strong, healthy tree. A tree in poor soil has weak, spindling, feeble branches, and, like a starved animal, takes a long time to recover, even when placed in better soil with better feeding.

After large trees are properly transplanted they should be staked, to prevent swaying around by the wind. When the ground is soft the movement of the top creates a displacement of the roots before they have taken any hold of the soil, resulting in injury or death to the tree. Mulching must not be dispensed with. Its object is to keep the soil moist until the roots obtain a strong hold. This may be overdone. Mulch for shade only. A large mass of decaying matter is more hurtful than beneficial. We can not avoid all risks in transplanting; but if these conditions, which we repeat, are followed, the risk will be very much lessened: Careful removal, protection from drying while out of the ground, setting in warm, well-pulverized soil, hard tramping the soil about the roots, judicious pruning, staking, and mulching.

All this requires care and labor; but it will make the difference between a thrifty, profitable orchard and a sickly and unprofitable one, or a fine-formed, well-grown shade or ornamental tree and a stunted, unhealthy specimen which has no beauty or gives no pleasure.—X.

If the trees are large, cut the top well back. The elm will grow if cut back to a pole; but if left with a full top the chances are that the tree will die, wholly or partially, leaving the living portion in unsatisfactory shape. A most common mistake is that of leaving too

much top. In case of the maple tree, however, the top should be lessened by thinning the branches, leaving the outline of the tree not much disturbed. This is necessary to secure the symmetrical oval shape which is the beauty of the maple. If great care be taken to secure all the roots, and as much earth as possible, a larger top than otherwise will be supported. If the tree stand upon a slope, take a spade and cut a narrow, leading channel in the turf, which will conduct more water to the roots of the tree, in case of a washing shower, than it would receive without this help.

PLANTING FORESTS.

The foregoing directions are for planting large trees for shade or ornament; the following are for planting forests for revenue:

To start forests of oak, hickory, walnut, and all other heavy-seeded trees, it is best and cheapest to plant the seeds just where the trees are to grow. One method of planting acorns and nuts, in practice by the Tharandt Forest Academy, of Saxony, is as follows: Take a stick sharpened at one end and shove it obliquely into the earth to the depth of two inches, not more (in hard or stony ground, the pick is used), put in the seed and press the soil above it down firmly with the foot. The seeds should be placed about three feet apart. For the catalpa, elm, maple, locust, evergreen, and all other light-seeded trees, it is best to plant the seed in beds, and transplant them three feet apart after one, two, or three years' growth.

These little trees can be planted very rapidly with a hoe or spade. Dig a small hole a little deeper than the roots; hold the plant vertically with the left hand, and with the right draw the soil carefully around the roots, and press it down with the hands and foot. If there are stones near by, place a few around the plant; they will help keep the surface moist, and prevent the weeds and grass from growing. In prairie lands, or where there is tough sod, the ground should be cultivated for three years, and then prepared as for wheat, and furrows may be run three feet apart, the seedlings laid in these furrows, and their roots covered with a plow. They need no other attention except to keep them free of weeds and to thin when necessary. For a full discussion of the subject of tree-planting and forest culture see Dr. F. B. Hough's report to our government for 1877. This exceedingly valuable book is, we believe, now out of print, but copies might be obtained from members of Congress of 1878–80.

FOREST CULTURE.

North of the Potomac, and east of the Ohio, and I presume in limited districts elsewhere, rocky, sterile wood-lands, costing from two dollars to fifty dollars per acre, according to locality, etc., are to-day the cheapest property to be bought in the United States, even though nothing were done with them but to keep out fire and cattle, and let the young trees grow as they will. Money can be more profitably and safely invested in lands covered by young timber than any thing else. The parent who would invest a few thousand for the bene-

fit of his children or grandchildren, while young, may buy woodlands which will be worth twenty times their present cost within the next twenty years. But better even than this would it be to buy up rocky, craggy, naked hill-sides, and eminences which have been pastured to death, and shutting out the cattle inflexibly, scratch these over with plow, mattock, hoe, or pick, as circumstances shall dictate; plant them thickly with chestnut, walnut, hickory, white oak, and the seeds of locust and white pine. Plant thickly and of divers kinds, so as to cover the ground promptly and choke out weeds and shrubs, with full purpose to thin and prune as circumstances shall dictate. Many farmers are averse to planting timber because they think nothing can be realized therefrom for the next twenty or thirty years, which is as long as they expect to live. But this is a grave miscalculation. Let us suppose a rocky, hilly pasture lot of ten or twenty acres, rudely scratched over as I have suggested, and thickly seeded with hickory nuts and white oak acorns only. Within five years it will yield abundantly of hoop-poles, though the better, more promising half be left to mature, as they should be; two years later another and larger crop of hoop-poles may be cut, still sparing the best, and thenceforth a valuable crop of timber may be taken from the land; for if cut at the proper season (October to March), at least two thrifty sprouts will start from every stump; and so that wood will yield a clear income each year, while the best trees are steadily growing and maturing. I do not advise restriction to those two species of timber, but I insist that a young plantation of forest trees may and should yield a clear income in every year after its fourth. HORACE GREELEY.

PROFITS OF FOREST CULTURE.

Many millions of dollars of American capital are invested in various enterprises which require a much longer time to yield profit or income and never pay nearly as well as systematic forest culture in the proper locality. Great fortunes are risked in wild speculations, in rail-roads which pay no dividends, in mining stocks which enrich only the agents, or brokers selling them, in lands and lots, which never attain the expected increase of value. But there is certainly no risk in forest culture. It produces an article of general and steadily increasing demand, and it can be calculated with almost mathematical certainty what profit may be derived from it and within what time.

The fact that it is highly remunerative in all Europe, where land is much higher in price than here, should justify the expectation that it will be profitable here. Our soil and climate produce a much larger variety of valuable timber than any European country. Several species of American trees are now cultivated there very extensively because of the superior qualities of the same and with a view to large profit therefrom. Our American hickory, black walnut, hard maple, and wild cherry for instance have none of their equals in Europe. They excite the envy of European carriage makers, furniture men, and manufacturers of tools. They are now largely imported from America, but the forest-men of Germany and France are earnestly engaged in raising them for the home market. Now it is well known that on this

continent forest trees grow much quicker and comparatively taller than in the eastern hemisphere. Here the most useful trees attain their full development in two-thirds of the time required in Europe, an advantage which can hardly be overestimated.

In the United States the consumption of timber *per capita* of the population is infinitely larger than in Europe, where no frame houses are built, where no new settlements are made, and where only a very small minority of the people are so situated that they may indulge in the luxury of fine furniture, buggies, and carriages. The parlor and sitting room furniture of any of our skilled mechanics, or small shop-keepers, made up from black walnut, cherry, or ash, would amply do for many a European officer of more than ordinary rank. In the rural districts of Spain, Italy, France, and Germany, hardly one out of a hundred persons is able to buy furniture of what we would call the most common kind. Here in America, the proportion of the use of timber for furniture and carriage work to its production has become really alarming. Within the past twenty-five years, the price of such timber has risen at a rapid rate and is still increasing. At any place not too distant from the ordinary transportation lines, every year's growth of a walnut, maple, or hickory tree represents a sure and respectable increase of the owner's capital.

The governments of Prussia, of several of the smaller German principalities, and of France, Austria, and Italy make forest-culture an unfailing source of a large yearly revenue. They find it profitable to buy tracts of inferior lands at prices equal to those of our best farming lands, and to stock them with timber. Many private landowners there also derive a large yearly income from their forests without ever diminishing the area of the same. Forests there are divided in enough equal parcels for yearly cutting to give the trees sufficient time for development, and each parcel is immediately replanted after having been cleared. Excepting a few remote mountain districts, there are no more natural forests in Central Europe. It is not profitable to let any forest tree remain growing after it has attained full age, as the forester calls it. In Central Europe oak grows to perfection in eighty to one hundred and twenty, beach and pine in thirty to fifty years. But it is not always intended to raise trees to full size, and it is really not so remunerative.

Only the better class of wheat or meadow-land nets a greater average revenue in twenty-five years than well-managed forests—a fact which may at first sight seem incredible, but which is easily accounted for by comparison between the yearly expenses of grain culture and the trifling outlay required for the planting and maintenance of a forest after the trees have become two or three years old, and by taking in consideration the frequent failures of grain crops and the sure steadiness of the growth of trees. Planting may be done by children.

With all the advantages in our favor, why should forest-culture not be just as profitable in Ohio as in any part of Europe? Our supply of timber, fit for furniture, carriages, and even cooperage is almost entirely exhausted. The many timber lots distributed all over the state are very deceptive. Closer inspection will show that nearly all the good trees of larger size have long ago found their way to the saw-

mills, and that only the wind-twisted and heart-rotten ones have remained. Spontaneous growth is not regular enough to be really profitable. The future supply of good timber in Ohio will consequently depend mostly upon systematic forest culture, and those first engaging in it will find ample remuneration for any capital or labor employed. They may derive a fortune from comparatively poor land, unfit for grain crops and of little account for pasturage.

Locust, although being a very hard and solid timber, will make fence posts and pavement blocks in eight years from the seed, and large trees in twelve years. Its beautiful golden yellow color, mixed with jet black, makes it well adapted for elegant furniture. Catalpa, which makes the best railroad ties, grows even quicker. Hickory, now largely exported to Europe, and coming in great demand there, will prove exceedingly profitable. Sown in rows three feet apart, the nuts six inches apart, the young trees will grow up straight and slender. In five years thinning out may commence, and hoop-poles may be sold; the next thinning out will give material for spokes and buggy fills; and the best trees, left standing at proper distances, will make a fine forest in less than twenty years. Black Walnut is a slower grower, but it is getting so costly that it is worth while to think of planting it for speculation. Men below the age of thirty-five years will be able to reap a rich harvest from the cultivation of this valuable timber before they have passed the best time of life. A forty-acre lot of Black Walnut forest, now planted, will, in twenty-five years, make its owner independently wealthy, without requiring much outlay or labor. I am told that a gentlemen, who twenty years ago, planted twelve acres of land in Southern Indiana with pecan nuts, made a fortune by it, and created the source of a large yearly revenue.

But the most profitable branch of forestry is certainly the cultivation of oak for tan-bark on the renewal or Hackwald system. The acorns (about six bushels to the acre) will be laid six inches apart and in rows three feet distant. The young saplings taken out by thinning may be used to great advantage in planting. In twelve years (under very favorable conditions even sooner) the trees will be large enough for cutting and peeling. New sprouts will grow out from the roots in the same year, and the second growth will prove more thrifty than the first. The revenue from such forests may be called perpetual. In Europe vast tracts of second class land are forested in this manner, and many formerly unproductive estates have been made highly valuable by this very Hackwald culture. The bark of the young and middle-sized trees contains more tannin and is therefore of higher value than that taken from old trees. Here in Ohio the bark of the chestnut-leaved oak is preferred to all others and almost exclusively used. The tree is a more rapid grower than other varieties of oak and is satisfied with the poorest of soil.

One of the most intelligent and experienced of the Cincinnati tanners informs me that in Cincinnati alone 18,000 cords of tan-bark are used per year, and even a larger quantity in Louisville. Seven trees of a foot in diameter will furnish one cord. The chestnut-leaved oak never forms entire forests by spontaneous growth, but is interspersed among other timber. My informant counted the chestnut-leaved oak-trees on

a comparatively very well-stocked 15,000 acre lot in Pulaski County, Ky., and found them to number 3,500. At that rate the tanneries of Cincinnati and Louisville alone would every year use up the trees spontaneously growing on about 100,000 acres of land. The few years since the Cincinnati and Southern Railroad has been in operation a belt of fourteen miles on both sides of the road, and of about two hundred miles in length, has been almost totally depleted of that valuable variety of timber. The same gentleman ventures to predict that within twenty years from now the entire supply of chestnut-oak bark in the United States will be exhausted. The price now varies from $14 to $28 per cord, and is steadily increasing. From carefully prepared reports of the forestry departments of the several German States and of Austria, it appears that an acre of properly cultivated Hackwald of the age of twelve years will furnish from four to five cords of tan-bark, and about six thousand feet of timber (board measure) fit for posts and for wagon-makers' work. The revenue from the wood covers all the expenses of planting and managing, leaving a surplus.

Under such circumstances, the foresting of inferior lands in Ohio, Kentucky, or West Virginia could not fail to lay the foundation of wealth for those who would now engage in it. Large tracts of such lands are now lying waste. The income derived therefrom is now generally not sufficient to pay the taxes and interest on the original purchase money. By the means of forest culture, they might be easily turned into well-paying estates, and while they are now not much more than a public nuisance, they may become an ornament of the State and a great benefit for the general public.

EMIL ROTHE.

VILLAGE IMPROVEMENT SOCIETIES.

In order to assist in organizing Village Improvement Societies, the following Constitution is given here. It is modeled after the constitution of the Laurel Hill Association of Stockbridge, Conn., and of the Wyoming and College Hill (Hamilton County, O.,) Village Improvement Societies.

ARTICLE I.

This Society shall be called the ——— Improvement Society.

ARTICLE II.

The object of this Society shall be to improve and ornament the streets and public grounds of the village by planting and cultivating trees, establishing and protecting grass-plats and borders in the avenues, and generally doing whatever may tend to the improvement of the village as a place of residence.

ARTICLE III.

The business of the Society shall be conducted by a board of nine directors—five gentlemen and four ladies, to be elected annually by the Society—who shall constitute the board. This board shall, from its own number, elect one President, two Vice-presidents, a Secretary, and Treasurer, and shall appoint such committees as they may deem advisable to further the ends of the Society.

ARTICLE IV.

It shall be the duty of the President, and, in his absence, of the senior Vice-president, to preside at all meetings of the Society, and to carry out all orders of the Board of Directors.

ARTICLE V.

It shall be the duty of the Secretary to keep a correct and careful record of all proceedings of the Society and of the Board of Directors, in a book suitable for their preservation, and such other duties as ordinarily pertain to the office.

ARTICLE VI.

It shall be the duty of the Treasurer to keep the funds of the Society, and to make such disbursements as may be ordered by the Board of Directors.

ARTICLE VII.

No debt shall be contracted by the Board of Directors beyond the amount of available funds within their control to pay it, and no member of this Society shall be liable for any debt of the Society beyond the amount of his or her subscription.

ARTICLE VIII.

Any adult person may become a member of this Society by paying two dollars ($2.00) annually. Any person not of age who shall plant and protect a tree, under the direction of the Board of Directors, or shall pay the sum of $1.00 annually, may become a member of this Society until of age, after which time their annual dues shall be increased to two dollars ($2.00), the same as other adults.

ARTICLE IX.

The annual meeting of the Society shall be held during the first week of October, at such place as the Board of Directors may select, and a notice of such meeting shall be posted in prominent places through the village. Other meetings of the Society may be called by the Board of Directors when desirable.

ARTICLE X.

At the annual meeting, the Board of Directors shall report the amount of money received during the year, and the source from which it has been received; the amount of money expended during the year, and the objects for which it has been expended; the number of trees planted at the cost of the Society, and the number planted by individuals; and, generally, all acts of the Board that may be of interest to the Society. This report shall be entered on the record of the Society.

ARTICLE XI.

This Constitution may be amended with the approval of two-thirds of the members present, at any annual meeting of the Society, or at any special meeting called for that purpose, a month's notice of the proposed amendment, with its object, having been given.

PART SECOND.

SELECTIONS ON TREES

FOR

ARBOR DAY CELEBRATIONS.

"The Tree of the Field is Man's Life."—BIBLE.

IT is gratifying to see Ohio take such deep interest in tree-planting, which is beginning so strongly to attract public attention. Setting apart one day for this purpose and making it a general holiday will add attractiveness to utility, and give it a deeper hold on the popular heart. But the happiest thought of all was to make it a holiday for the public schools, and have the children practically take part in it and set out groups of trees for their favorite authors. You thus not only connect trees with the associations of childhood and their pleasantest holidays, but with authors from whom they receive their earliest and best impressions.

We sometimes forget that the highest aim of education is to form right character—and that is accomplished more by impressions made upon the heart than by knowledge imparted to the mind.

The awakening of our best sympathies—the cultivation of our best and purest tastes—strengthening the desire to be useful and good, and directing youthful ambition to unselfish ends—such are the objects of true education. Surely nothing can be better calculated to procure these ends than the holiday set apart for the public schools.

J. T. HEADLEY: *Extract from Letter.*

WHEN we plant a tree, we are doing what we can to make our planet a more wholesome and happier dwelling-place for those who come after us if not for ourselves.

As you drop the seed, as you plant the sapling, your left hand hardly knows what your right hand is doing. But Nature knows, and in due time the Power that sees and works in secret will reward you openly. You have been warned against hiding your talent in a napkin; but if your talent takes the form of a maple-key or an acorn, and your napkin is a shred of the apron that covers "the lap of the earth," you may hide it there, unblamed; and when you render in your account you will find that your deposit has been drawing compound interest all the time.

OLIVER WENDELL HOLMES: *Extract from Letter.*

We wish to wake up the people of Ohio to the value of their forests, and to prevent the fulfillment of the prediction of Bryant's Indian at the burial-place of his fathers:

But I behold a fearful sign,
To which the white man's eyes are blind.
Before these fields were shorn and tilled,
Full to the brim our rivers flowed,
The melody of waters filled
The fresh and boundless wood.
And torrents dashed and rivulets played,
And fountains sported in the shade.
These grateful sounds are heard no more,
The springs are silent in the sun,
The rivers, by the blackened shore,
With lessening currents run;
The realm our tribes are crushed to get
May be a barren desert yet.

The trees may outlive the memory of more than one of those in whose honor they were planted. But if it is something to make two blades of grass grow where only one was growing, it is much more to have been the occasion of the planting of an oak which shall defy twenty scores of Winters, or of an elm which shall canopy with its green cloud of foliage half as many generations of mortal immortalities. I have written many verses, but the best poems I have produced are the trees I planted on the hill-side which overlooks the broad meadows, scalloped and rounded at their edges by loops of the sinuous Housatonic. Nature finds rhymes for them in the recurring measures of the seasons. Winter strips them of their ornaments and gives them, as it were, in prose translation, and Summer reclothes them in all the splendid phrases of their leafy language.

What are these maples and beeches and birches but odes and idyls and madrigals? What are these pines and firs and spruces but holy hymns, too solemn for the many-hued raiment of their gay deciduous neighbors? Oliver Wendell Holmes: *Extract from Letter.*

The objects of the restoration of the forests are as multifarious as the motives which have led to their destruction, and as the evils which that destruction has occasioned. The planting of the mountains will diminish the frequency and violence of river inundations, prevent the formation of torrents; mitigate the extremes of atmospheric temperature, humidity, and precipitation; restore dried-up springs, rivulets, and sources of irrigation; shelter the fields from chilling and from parching winds; prevent the spread of miasmatic effluvia; and, finally, furnish an inexhaustible and self-renewing supply of material indispensable to so many purposes of domestic comfort, to the successful exercise of every act of peace, every destructive energy of war.

George P. Marsh, "*Man and Nature.*"

THE WAYSIDE INN—AN APPLE-TREE.

I HALTED at a pleasant inn,
As I my way was wending—
A golden apple was the sign,
From knotty bough depending.

Mine host—it was an apple-tree—
He smilingly received me,
And spread his choicest, sweetest fruit,
To strengthen and relieve me.

Full many a little feathered guest
Came through his branches springing;
They hopped and flew from spray to spray,
Their notes of gladness singing.

Beneath his shade I laid me down,
And slumber sweet possessed me;
The soft wind blowing through the leaves
With whispers low caressed me.

And when I rose, and would have paid
My host so open-hearted,
He only shook his lofty head—
I blessed him, and departed.

FROM THE GERMAN.

I LOVE thee in the Spring,
Earth-crowning forest! when amid the shades
The gentle South first waves her odorous wing,
And joy fills all the glades.

In the hot Summer time,
With deep delight, the somber aisles I roam,
Or, soothed by some cool brook's melodious chime
Rest on thy verdant loam.

But O, when Autumn's hand
Hath marked thy beauteous foliage for the grave,
How doth thy splendor, as entranced I stand,
My willing heart enslave!

WM. JEWETT PABODIE.

THE groves were God's first temples. Ere man learned
To hew the shaft and lay the architrave,
And spread the roof above them,—ere he framed
The lofty vault to gather and roll back
The sound of anthems; in the darkling wood,
Amidst this cool and silence, he knelt down,
And offered to the Mightiest solemn thanks
And supplication.

WILLIAM CULLEN BRYANT.

FOREST SONG.

A song for the beautiful trees,
  A song for the forest grand,
  The garden of God's own hand,
The pride of his centuries.
Hurrah! for the kingly oak,
  For the maple, the forest queen,
For the lords of the emerald cloak,
  For the ladies in living green.

For the beautiful trees a song,
  The peers of a glorious realm,
  The linden, the ash, and the elm,
So brave and majestic and strong.
Hurrah! for the beech tree trim,
  For the hickory staunch at core,
For the locust, thorny and grim,
  For the silvery sycamore.

A song for the palm, the pine,
  And for every tree that grows,
  From the desolate zone of snows
To the zone of the burning line.
Hurrah! for the warders proud
  Of the mountain-side and vale,
That challenge the lightning cloud,
  And buffet the stormy gale.

A song for the forest aisled,
  With its Gothic roof sublime,
  The solemn temple of Time,
Where man becometh a child,
As he listens the anthem-roll
  Of the wind in the solitude,
The hymn that telleth his soul
  That God is the Lord of the wood.

So long as the rivers flow,
  So long as the mountains rise,
  May the forests sing to the skies,
And shelter the earth below.
Hurrah! for the beautiful trees!
  Hurrah! for the forest grand,
The pride of his centuries,
  The garden of God's own hand.

PROF. W. H. VENABLE.

This song was written expressly for Cincinnati "Arbor Day," 1882.

THE wealth, beauty, fertility, and healthfulness of the country largely depend upon the conservation of our forests and the planting of trees. JOHN GREENLEAF WHITTIER: *Extract from Letter.*

SONG TO THE TREES.

I.

HAIL to the trees!
Patient and generous, mothers of mankind,
Arching the hills, the minstrels of the wind,
Spring's glorious flowers, and Summer's balmy tents,
A sharer in man's free and happier sense.
From early blossom till the north wind calls
Its drowsy sprites from beech-hid waterfalls,
The trees bless all, and then, brown-mantled, stand
The sturdy prophets of a golden land.

II.

Eden was clothed in trees; their glossy leaves
Gave raiment, food, and shelter; 'neath their eaves
Dripping with ruby dew the flow'rets rose
To follow man from Eden to his woes.
The silver rill crept fragrant thickets through,
The air was rich with life, a violet hue
Tangling with sunshine lit the waving scene,
'Twas heaven, tree-born, tree-lulled, enwreathed in green.

III.

Where trees are not, behold the deserts swoon
Beneath the brazen sun and mocking moon.
Where trees are not, the tawny torrent leaps,
A brawling savage from the crumbling steeps,
Where once the ferns their gentle branches waved,
And tender lilies in the crystal laved;
A brawling savage, plundering in a night,
The fields it once strayed through a streamlet bright.

IV.

What gardeners like the trees; their loving care
The daintiest blooms can deftly plant and rear.
How smilingly with outstretched boughs they stand
To shade the flowers too fragile for man's hand.
With scented leaves, crisp, ripened, nay, not dead,
They tuck the wild flowers in their moss-rimmed bed.
The forest nook outvies the touch of art,
The heart of man loves not like the oak's heart.

V.

O whispering trees, companions, sages, friends,
No change in you, whatever friendship ends;
No deed of yours the Eden link e'er broke;
Bared is your head to ward the lightning's stroke.
You fed the infant man, and blessed his cot,
Hewed from your grain; without you he were not,
The hand that planned you planned the future, too.
Shall we distrust it, knowing such as you?

VI.

And when comes Eden back? The trees are here,
In all their olden beauty and glad cheer.
Eden but waits the lifting of the night,
For man to know the true and will the right.
Whatever creed may find in hate a birth,
One of the heavens is this teeming earth;
"Of all its gifts but innocence restore,
And Eden," sigh the trees, "is at your door."

JOSEPH W. MILLER.

This poem was written expressly for Cincinnati "Arbor Day," 1882.

THE OAK.

A GLORIOUS tree is the old gray oak;
He has stood for a thousand years—
Has stood and frowned
On the trees around,
Like a king among his peers;
As around their king they stand, so now,
When the flowers their pale leaves fold,
The tall trees round him stand, arrayed
In their robes of purple and gold.
He has stood like a tower
Through sun and shower,
And dared the winds to battle;
He has heard the hail,
As from plates of mail,
From his own limbs shaken, rattle;
He has tossed them about, and shorn the tops
(When the storm has roused his might)
Of the forest trees, as a strong man doth
The heads of his foes in fight.

GEORGE HILL: *"Fall of the Oak."*

WHEN the sun begins to fling
His flaring beams, me, goddess, bring
To arched walks of twilight groves,
And shadows brown, that Sylvan loves,
Of pine or monumental oak.

MILTON.

'TIS beautiful to see a forest stand,
Brave with its moss-grown monarchs and the pride
Of foliage dense, to which the south wind bland
Comes with a kiss as lover to his bride;
To watch the light grow fainter, as it streams
Through arching aisles, where branches interlace,
Where somber pines rise o'er the shadowy gleams
Of silver birch, trembling with modest grace.

WHAT conqueror in any part of "life's broad field of battle" could desire a more beautiful, a more noble, or a more patriotic monument than a tree planted by the hands of pure and joyous children, as a memorial of his achievements?

What earnest, honest worker with hand and brain, for the benefit of his fellowmen, could desire a more pleasing recognition of his usefulness than such a monument, a symbol of his or her productions, ever growing, ever blooming, and ever bearing wholesome fruit?

Trees already grown ancient have been consecrated by the presence of eminent personages or by some conspicuous event in our national history, such as the Elm tree at Philadelphia, at which William Penn made his famous treaty with nineteen tribes of barbarians; the Charter Oak at Hartford, which preserved the written guarantee of the liberties of the Colony of Connecticut; the wide-spreading Oak tree of Flushing, Long Island, under which George Fox, the founder of the Society of Friends or Quakers, preached; the lofty Cypress tree in the Dismal Swamp under which Washington reposed one night in his young manhood; the huge French Apple tree near Ft. Wayne, Ind., where Little Turtle, the great Miami chief, gathered his warriors; the Elm tree at Cambridge, in the shade of which Washington first took command of the Continental army on a hot Summer's day; the Tulip tree on King's Mountain battlefield in South Carolina, on which ten bloodthirsty Tories were hung at one time; the tall Pine tree at Ft. Edward, N. Y., under which the beautiful Jane McCrea was slain; the magnificent Black Walnut tree, near Haverstraw on the Hudson, at which General Wayne mustered his forces at midnight, preparatory to his gallant and successful attack on Stony Point; the grand Magnolia tree near Charleston, S. C., under which General Lincoln held a council of war previous to surrendering the city; the great Pecan tree at Villere's plantation, below New Orleans, under which a portion of the remains of General Packenham was buried, and the Pear trees planted, respectively, by Governor Endicott, of Massachusetts, and Governor Stuyvesant, of New York, more than two hundred years ago.

These trees all have a place in our national history, and are inseparable from it because they were so consecrated. My eyes have seen all but one of them, and patriotic emotions were excited at the sight. How much more significant and suggestive is the dedication of a young tree as a monument.

BENSON J. LOSSING, Historian: *Extract from Letter.*

THE project of connecting the planting of trees with the names of authors is a beautiful one, and one certain to exert a beneficial influence upon the children who participate in these exercises. The institution of an "Arbor Day" is highly commendable from its artistic consequences, and can not fail to result in great benefit to the climate and to the commercial interests of the country when it becomes an institution of general adoption.

PROF. B. PICKMAN MANN, son of Horace Mann: *Extract from Letter.*

A LITTLE of thy steadfastness,
Rounded with leafy gracefulness,
Old oak, give me—
That the world's blast may round me blow,
And I yield gently to and fro,
While my stout-hearted trunk below,
And firm-set roots unshaken be.

LOWELL.

FROM the earth's loosened mould
The sapling draws sustenance and thrives;
Though stricken to the heart with Winter's cold,
The drooping tree revives.

The softly warbled song
Comes from the pleasant woods, and colored wings
Glance quick in the bright sun, that moves along
The forest openings.

When the bright sunset fills
The silver woods with light, the green slope throws
Its shadow in the hollows of the hills,
And wide the upland grows.

LONGFELLOW.

IT is a great pleasure to think of the young people assembling to celebrate the planting of trees, and connecting them with the names of authors whose works are the farther and higher products of our dear old Mother Nature. An Oriental poet says of his hero:

"Sunshine was he in a Wintery place,
And in midsummer coolness and shade."

Such are all true thinkers, and no truer monuments of them can exist than beautiful trees. Our word book is from the beech tablets on which men used to write. Our word Bible is from the Greek for bark of a tree. Our word paper is from the tree papyrus—the tree which Emerson found the most interesting thing he saw in Sicily. Our word library is from the Latin *liber*, bark of a tree. Thus literature is traceable in the growth of trees, and was originally written on leaves and wooden tablets. The West responds to the East in associating great writers with groups of trees, and a grateful posterity will appreciate the poetry of this idea as well while it enjoys the shade and beauty which the schools are securing for it.

MONCURE D. CONWAY: *Extract from Letter.*

IMPARTING to waste places more than their pristine beauty and associating the names of departed loved ones with our work is a poetic and sublime conception. It symbolizes our faith in a resurrection to a higher and better life when the hard struggles of this sin-cursed world are passed. GEN. SAMUEL F. CARY: *Extract from Letter.*

THEY who dwell beside the stream and hill
  Prize little treasures there so kindly given:
The song of birds, the babbling of the rill,
  The pure, unclouded light and aid of heaven.
They walk as those who seeing can not see,
  Blind to this beauty even from their birth;
We value little blessings ever free;
  We covet most the rarest things of earth.

But rising from the dust of busy streets
  These forest children gladden many hearts;
As some old friend their welcome presence greets
  The toil-worn soul, and fresher life imparts.
Their shade is doubly grateful when it lies
  Above the glare which stifling walls throw back;
Through quivering leaves we see the soft blue skies,
  Then happier tread the dull, unvaried track.

ALICE B. NEAL: "*Trees in the City.*"

THE FOREST FLOWERS.

OUR forests are fast disappearing. In their sheltering shade and the rich mold of their annually decaying leaves, the greater number of our loveliest plants are found; and when the ax comes, that cruel weapon that wars upon nature's freshness, and the noble oak, the elm, the beech, the maple, and the tulip-tree fall with a loud crash in the peaceful solitude, even the very birds can understand that a floral death-knell sounds through the melodious wilderness.

A number of our choicest plants are threatened with extinction; for as the woods are cleared away these tender offsprings, the pretty flowers, which we so dearly cherish, will perish utterly. It is, therefore, well to prevent as far as possible the destruction of our native forests, as well as to plant forest trees, if for no other purpose than the preservation of the little helpless, blooming beauties that adorn our woodland shades.

GUSTAVUS FRANKENSTEIN.

OF the infinite variety of fruits which spring from the bosom of the earth, the trees of the wood are greatest in dignity. Of all the works of the creation which know the changes of life and death, the trees of the forest have the longest existence. Of all the objects which crown the gray earth, the woods preserve unchanged, throughout the greatest reach of time, their native character. The works of man are ever varying their aspect; his towns and his fields alike reflect the unstable opinions, the fickle wills and fancies of each passing generation; but the forests on his borders remain to-day the same they were ages of years since. Old as the everlasting hills, during thousands of seasons they have put forth, and laid down their verdure in calm obedience to the decree which first bade them cover the ruins of the Deluge.

SUSAN FENIMORE COOPER: "*Rural Hours.*"

THE monarch oak, the patriot of the trees,
Shoots rising up, and spreads by slow degrees;
Three centuries he grows, and then he stays
Supreme in state; and in three more decays.

DRYDEN.

THE young oak grew, and proudly grew,
For its roots were deep and strong;
And a shadow broad on the earth it threw,
And the sunshine linger'd long
On its glossy leaf, where the flickering light
Was flung to the evening sky;
And the wild bird sought to its airy height,
And taught her young to fly.

MRS. E. OAKES SMITH: "*The Acorn.*"

A TREE, to the thoughtful and loving student of nature, suggests ideas of beauty and perfection to which the mind can not be lifted, save by a process of wondering admiration.

FRANCIS GEORGE HEATH.

ALAS, in how many places is the forest which once lent us shade nothing more than a memory! The grave and noble circle which adorned the mountain is every day contracting. Where you come in hope of seeing life, you find but the image of death. O, who will really undertake the defense of the trees, and rescue them from senseless destruction? Who will eloquently set forth their manifold mission, and their active and incessant assistance in the regulation of the laws which rule our globe? Without them, it seems delivered over to blind destiny, which will involve it again in chaos! The motive powers and purificators of the atmosphere through the respiration of their foliage, avaricious collectors to the advantage of future ages of the solar heat, it is they which pacify the storm and avert its most disastrous consequences. In the low-lying plains, which have no outlet for their waters, the trees, long before the advent of man, drained the soil by their roots, forcing the stagnant waters to descend and construct at a lower depth their useful reservoirs. And now, on the abrupt declivities, they consolidate the crumbling soil, check and break the torrent, control the melting of the snows, and preserve to the meadows the fertile humidity which in due time will overspread them with a sea of flowers.

And is not this enough? To watch over the life of the plant and its general harmony, is it not to watch over the safety of humanity?

The tree, again, was created for the nurture of man, to assist him in his industries and his arts. It is owing to the tree, to its soul, earth-buried for so many centuries, and now restored to light, that we have secured the wings of the steam-engine.

Thank Heaven for the trees! With my feeble voice I claim for them the gratitude of man.

MADAME MICHELET: "*Nature, or the Poetry of Earth and Sea.*"

O, WHO is there within whose heart
The love of noble manhood dwells,
Who feels the thrill of pleasure start
When other tongue the story tells

Of deeds sublime? with true eye sees
The beautiful in art and thought—
Dares stand before God's stately trees,
Declaring that he loves them not?

Companions of our childhood days!
Companions still, though grown we be!
Still through thy leaves the light breeze strays,
Whispering the same old songs to me.

. . . . . .

Dear forest! down thy long aisles dim
Soft sweeps the zephyr's light caress;
Worthy indeed art thou of Him
Who made thee in thy loveliness.

Long may thy graceful branches wave,
Piercing with pride the balmy air;
Harm ne'er would come if I could save—
Fit objects of our love and care.

But though erect each noble form,
As year by year rolls swift along
Thou too, like man, must face the storm,
And fall—or live to be more strong.

Forever upward, day by day,
Patient thy growing branches turn;
Nearer the heavens each year alway—
May we the simple lesson learn—

Though few our years or many be,
It matters not the number given,
If we can feel that, like the tree,
Each year hath found us nearer heaven.

MAGGIE MAY WELSH, Lancaster, O.

Written for Cincinnati "Arbor Day" Celebrations.

WHAT a noble gift to man are the forests! What a debt of gratitude and admiration we owe for their utility and their beauty! How pleasantly the shadows of the wood fall upon our heads when we turn from the glitter and turmoil of the world of man! The winds of heaven seem to linger amid their balmy branches, and the sunshine falls like a blessing upon the green leaves; the wild breath of the forest, fragrant with bark and berry, fans the brow with grateful freshness; and the beautiful woodlight, neither garish nor gloomy, full of calm and peaceful influences, sheds repose over the spirit.

SUSAN FENIMORE COOPER: "*Rural Hours.*"

THE FOREST.

I LOVE thee when thy swelling buds appear,
And one by one their tender leaves unfold,
As if they knew that warmer suns were near,
Nor longer sought to hide from Winter's cold;
And when with darker growth thy leaves are seen
To veil from view the early robin's nest,
I love to lie beneath thy wooing screen,
With limbs by Summer's heat and toil oppress'd;
And when the Autumn wind has stripped thee bare,
And round thee lies the smooth, untrodden snow,
When naught is thine that made thee once so fair,
I love to watch thy shadowy form below,
And through thy leafless arms to look above
On stars that brighter beam when most we need their love.

JONES VERY: "*The Tree.*"

THE heave, the wave, and bend
Of everlasting trees, whose busy leaves
Rustle their songs of praise, while ruin weaves
A robe of verdure for their yielding bark,
While mossy garlands, full and rich and dark,
Creep slowly round them! Monarch of the wood,
Whose mighty scepters sway the mountain brood,
Shelter the winged idolaters of Day—
And grapple with the storm-god, hand to hand,
Then drop like weary pyramids away,
Stupendous monuments of calm decay.

JOHN NEAL.

WELCOME, ye shades! ye bowery thickets, hail!
Ye lofty pines! ye venerable oaks!
Ye ashes wild! Resounding o'er the steep!
Delicious is your shelter to the soul.

THOMSON.

MOST worthy of the oaken wreath
The ancients him esteemed,
Who, in a battle had from death
Some man of worth redeemed.

DRAYTON.

THERE oft the muse, what most delights her, sees
Long living galleries of aged trees,
Bold sons of earth, that lift their arms so high,
As if once they would invade the sky.
In such green palaces the first kings reigned,
Slept in their shade, and angels entertained;
With such old councilors they did advise,
And, by frequenting sacred groves, grew wise.

THE OAK.

With his gnarled old arms and his iron form,
Majestic in the wood,
From age to age, in sun and storm,
The live-oak long has stood;
And generations come and go,
And still he stands upright,
And he sternly looks on the world below,
As conscious of his might.

A song to the oak, the brave old oak,
Who hath ruled in the greenwood long?
Here's health and renown to his broad green crown,
And his fifty arms so strong!
There's fear in his frown, when the sun goes down,
And the fire in the west fades out;
And he showeth his might on a wild midnight,
When the storm through his branches shout.

. . . . . .

Then here's to the oak, the brave old oak,
Who stands in his pride alone;
And still flourish he, a hale green tree,
When a hundred years are gone.

H. F. Chorley.

Oh! come to the woodlands, 't is joy to behold,
The new waken'd buds in our pathway unfold;
For Spring has come forth, and the bland southern breeze
Is telling the tale to the shrub and the trees,
Which, anxious to show her
The duty they owe her,
Have decked themselves gayly in emerald and gold.

Welcome, pure thoughts! welcome, ye silent groves!
These guests, these courts, my soul most dearly loves;
Now the winged people of the sky shall sing
My cheerful anthems to the gladsome Spring;
And if contentment be a stranger,—then
I'll ne'er look for it, but in heaven again.

Sir Henry Wotton.

The oak, for grandeur, strength, and noble size,
Excels all trees that in the forest grow;
From acorn small, that trunk, those branches rise,
To which such signal benefits we owe.
Behold, what shelter in its ample shade,
From noontide sun, or from the drenching rain.
And of its timber stanch, vast ships are made,
To sweep rich cargoes o'er the watery main.

PROUD monarch of the forest!
That once a sapling bough,
Didst quail far more at evening's breath
Than at the tempest now.
Strange scenes have pass'd, long ages roll'd
Since first upon thy stem,
Then weak as osier twig, Spring set
Her leafy diadem.

To thee but little recks it
What seasons come or go;
Thou lov'st to breathe the gale of Spring
And bask in Summer's glow;
But more to feel the Wintry winds
Sweep by in awful mirth,
For well thou know'st each blast will fix
Thy roots more deep in earth.

Would that to me life's changes
Did thus with blessings come!
That mercies might, like gales of Spring
Cause some new grace to bloom!
And that the storm which scattereth
Each earth-born hope abroad,
Might anchor those of holier birth
More firmly on my God.

OH, ROSALIND! these trees shall be my books,
And in their barks my thoughts I'll character,
That every eye which in this forest looks
Shall see thy virtue witnessed everywhere.

SHAKESPEARE: *"As You Like It."*

TEACHERS will please give the pupils the following account of the way in which Mr. Morris came to write the poem, "Woodman, Spare that Tree." The poem should then be memorized by all the pupils, and recited or sung on "Arbor Day." Mr. Morris, in a letter to a friend, dated New York, February 1, 1837, gave in substance the following account. Riding out of town a few days since, in company with a friend, an old gentleman, he invited me to turn down a little, romantic woodland pass, not far from Bloomingdale. "Your object?" inquired I. "Merely to look once more at an old tree planted by my grandfather long before I was born, under which I used to play when a boy, and where my sisters played with me. There I often listened to the good advice of my parents. Father, mother, sisters—all are gone; nothing but the old tree remains." And a paleness overspread his fine countenance, and tears came to his eyes. After a moment's pause, he added: "Do n't think me foolish. I do n't know how it is: I never ride out but I turn down this lane to look at that old tree. I have a thousand recollections about it, and I always greet it as a familiar and well-remembered friend." These words were scarcely uttered when the old gentleman cried out, "There it is!" Near the tree stood a man with his coat off, sharpening an ax. "You 're not going to cut that tree down, surely?" "Yes, but I

am, though," said the woodman. "What for?" inquired the old gentleman, with choked emotion. "What for? I like that! Well, I will tell you. I want the tree for firewood." "What is the tree worth to you for firewood?" "Why, when down, about ten dollars." "Suppose I should give you that sum," said the old gentleman, "would you let it stand?" "Yes." "You are sure of that?" "Positive!" "Then give me a bond to that effect." We went into the little cottage in which my companion was born, but which is now occupied by the woodman. I drew up the bond. It was signed, and the money paid over. As we left, the young girl, the daughter of the woodman, assured us that while she lived the tree should not be cut. These circumstances made a strong impression on my mind, and furnished me with the materials for the song I send you.

WOODMAN, spare that tree!
Touch not a single bough!
In youth it sheltered me,
And I'll protect it now.
'T was my forefather's hand
That placed it near his cot;
There, woodman, let it stand;
Thy ax shall harm it not!

That old familiar tree,
Whose glory and renown
Are spread o'er land and sea,—
And wouldst thou hack it down?
Woodman, forbear thy stroke!
Cut not its earth-bound ties;
O, spare that aged oak,
Now towering to the skies!

When but an idle boy
I sought its grateful shade;
In all their gushing joy,
Here, too, my sisters played.
My mother kissed me here;
My father pressed my hand—
Forgive the foolish tear;
But let that old oak stand.

My heart-strings round thee cling,
Close as thy bark, old friend;
Here shall the wild-bird sing,
And still thy branches bend.
Old tree! the storm still brave!
And, woodman, leave the spot;
While I've a hand to save,
Thy ax shall harm it not.

GEORGE P. MORRIS.

The following additional selections on trees were made by Prof. W. H. Venable.

If I could put my woods in song,
  And tell what's there enjoyed,
All men would to my garden throng,
  And leave the cities void.

In my plot no tulips blow—
  Snow-loving pines and oaks instead;
And rank the savage maples grow
  From Spring's faint flush to Autumn red.

My garden is a forest ledge,
  Which older forests bound;
The banks slope down to the blue lake-edge,
  Then plunge to depths profound.

EMERSON: "*My Garden.*"

My fugitive years are all hasting away,
And I must erelong be as lowly as they;
With a turf on my breast and a stone at my head,
Ere another such grove shall arise in its stead.

WILLIAM COWPER.

Oh! bear me then to vast embowering shades;
To twilight groves, and visionary vales;
To weeping grottoes, and prophetic glooms!
Where angel forms athwart the solemn dusk
Tremendous, sweep, or seem to sweep, along;
And voices, more than human, through the void,
Deep-sounding, seize the enthusiastic ear.

THOMSON: "*Autumn.*"

Here Nature does a house for me erect,
Nature, the wisest architect,
  Who those fond artists does despise
That can the fair and living trees neglect,
  Yet the dead timber prize.

COWLEY.

O, willow, why forever weep,
  As one who mourns an endless wrong?
What hidden woe can lie so deep?
  What utter grief can last so long?

Mourn on forever, unconsoled,
  And keep your secret, faithful tree!
No heart in all the world can hold
  A sweeter grace than constancy.

ELIZABETH A. ALLEN.

I CARE not how men trace their ancestry,
To ape or Adam; let them please their whim;
But I, in June, am midway to believe
A tree among my far progenitors—
Such sympathy is mine with all the race.

JAMES RUSSELL LOWELL.

NAY, doubt we not that under the rough rind,
In the green veins of these fair growths of earth,
There dwells a nature that receives delight
From all the gentle processes of life,
And shrinks from loss of being. Dim and faint
May be the sense of pleasure and of pain,
As in our dreams; but, haply, real still.

BRYANT: "*Among the Trees.*"

NOW saucy Phœbus' scorching beams,
In flaming Summer pride,
Dry-withering waste my foamy streams,
And drink my crystal tide.

Would, then, my noble master please,
To grant my highest wishes,
He 'll shade my banks wi' tow'ring trees
And bonnie spreading bushes.

Let lofty firs and ashes cool,
My lowly banks o'erspread,
And view, deep bending in the pool,
Their shadows' wat'ry bed.

Let fragrant birks, in woodbines drest
My craggy cliffs adorn;
And, for the little songster's nest,
The close embow'ring thorn.

ROBERT BURNS.

THE POPLAR FIELD.

THE poplars are felled; farewell to the shade,
And the whispering sound of the cool colonnade.
The winds play no longer and sing in the leaves,
Nor Ouse on his bosom their image receives.

Twelve years have elapsed since I first took a view
Of my favorite field, and the bank where they grew;
And now in the grass, behold, they are laid,
And the tree is my seat that once lent me a shade.

The blackbird has fled to another retreat,
Where the hazels afford him a screen from the heat,
And the scene where his melody charmed me before
Resounds with his sweet flowing ditty no more.

TIME made thee what thou wast, king of the woods;
And time hath made thee what thou art—a cave
For owls to roost in. Once thy spreading boughs
O'erhung the champaign; and the numerous flocks
That grazed it, stood beneath that ample cope
Uncrowded, yet safe sheltered from the storm.
No flock frequents thee now. Thou hast outlived
Thy popularity, and art become
(Unless verse rescue thee awhile) a thing
Forgotten, as the foliage of thy youth.

COWPER: "*Yardly Oak.*"

THE WOODLAND HALLO.

IN our cottage, that peeps from the skirts of the wood,
I am mistress, no mother have I;
Yet blithe are my days, for my father is good,
And kind is my lover, hard by.
They both work together beneath the green shade—
Both woodmen, my father and Joe;
Where I've listened whole hours to the echo that made
So much of a laugh or hallo.

From my basket at noon they expect their supply,
And with joy from my threshold I spring
For the woodlands I love, and the oaks waving high,
And Echo, that sings as I sing.
Though deep shades delight me, yet love is my food
As I call the dear name of my Joe;
His musical shout is the pride of the wood,
And my heart leaps to hear the hallo.

Simple flowers of the grove, little birds, live at ease,
I wish not to wander from you;
I'll still dwell beneath the deep roar of your trees,
For I know that my Joe will be true.
The trill of the robin, the coo of the dove,
Are charms that I'll never forego;
But, resting through life on the bosom of love,
Will remember the Woodland Hallo.

ROBERT BLOOMFIELD.

IN June 't is good to lie beneath a tree
While the blithe season comforts every sense,
Steeps all the brain in rest, and heals the heart,
Brimming it o'er with sweetness unawares.
Fragrant and silent as that rosy snow,
Wherewith the pitying apple tree fills up
And tenderly lines some last-year robin's nest.

LOWELL.

MUCH can they praise the trees so straight and hy,
The sayling pine, the cedar proud and tall;
The vine-propp elme, the poplar never dry;
The builder oake, sole king of forests all;
The aspine good for staves; the cypresse funerall;
The laurell, meed of mightie conquerors
And poets' sage; the firre that weepeth still;
The willow, worne of forlorne paramours;
The eugh obedient to the bender's will;
The birch for shaftes; the sallow for the mill;
The mirrhe, sweet, bleeding in the bitter wound;
The warlike beech; the ash for nothing ill;
The fruitful olive, and the platane round;
The carver holme; the maple, seldom inward sound.

SPENSER: "*Faerie Queen*," *Canto I.*

HAIL, old patrician trees so great and good!
Hail, ye plebeian under-wood!
Where the poetic birds rejoice,
And for their quiet nests and plenteous food
Pay with their grateful voice.

Hail, the poor Muses' richest manor-seat!
Ye country houses and retreat,
Which all the happy gods so love,
That for you oft they quit their bright and great
Metropolis above.

THE PINE TREE.

Old as Jove,
Old as Love,
Who of me
Tells the pedigree?
Only the mountains old,
Only the waters cold,
Only moon and star,
My coevals are.
Ere the first fowl sung,
My relenting boughs among,
Ere Adam wived,
Ere Adam lived,
Ere the duck dived,
Ere the bees hived,
Ere the lion roared,
Ere the eagle soared,
Light and heat, land and sea,
Spake unto the oldest tree.

EMERSON: "*Wood Notes.*"

THE PINE TREE.

The tremendous unity of the pine absorbs and moulds the life of a race. The pine shadows rest upon a nation. The northern peoples, century after century, lived under one or other of the two great powers of the pine and the sea, both infinite. They dwelt amidst the forests as they wandered on the waves, and saw no end nor any other horizon. Still the dark, green trees, or the dark, green waters jagged the dawn with their fringe or their foam. And whatever elements of imagination, or of warrior strength, or of domestic justice were brought down by the Norwegian or the Goth against the dissoluteness or degradation of the south of Europe were taught them under the green roofs and wild penetralia of the pine.

RUSKIN: "*Modern Painters.*"

THERE is a pleasure in a pathless wood.

BYRON.

THERE is a serene and settled majesty in woodland scenery that enters into the soul, and delights and elevates it, and fills it with noble inclinations.

WASHINGTON IRVING.

As the leaves of trees are said to absorb all noxious qualities of the air, and to breathe forth a purer atmosphere, so it seems to me as if they drew from us all sordid and angry passions, and breathed forth peace and philanthropy.

WASHINGTON IRVING.

THERE is something nobly simple and pure in a taste for the cultivation of forest trees. It argues, I think, a sweet and generous nature to have this strong relish for the beauties of vegetation, and this friendship for the hardy and glorious sons of the forest. There is a grandeur of thought connected with this part of rural economy. It is, if I may be allowed the figure, the heroic line of husbandry. It is worthy of liberal, and free born, and aspiring men. He who plants an oak, looks forward to future ages, and plants for posterity. Nothing can be less selfish than this.

WASHINGTON IRVING.